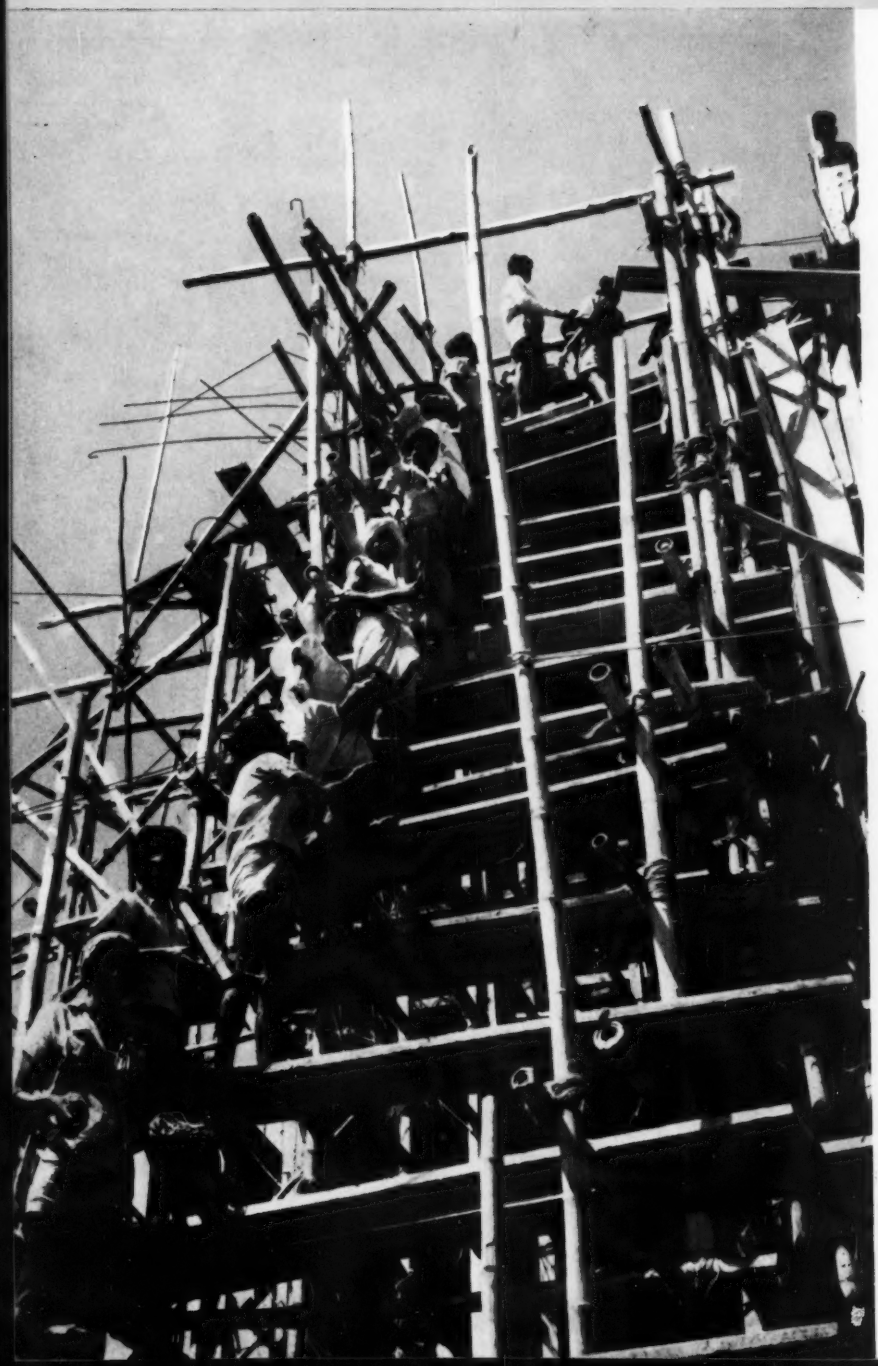
SEPTEMBER 23, 1961

Chemical Week

A McGRAW-HILL PUBLICATION PRICE FIFTY CENTS

INDIA'S CHEMICAL BUILDUP

Special Report . . . p. 65



SPECIAL–CW team reports from hurricane-battered Gulf Coast . . . . . p. 20

Wash-and-wear goal: longer-lasting treatments that don't wash out . . p. 47

Pulping payoff in prospect. New equipment promises better bleaching . p. 81

Adipic price cut clears way to 80-million-lbs./year non-nylon sales . p. 95

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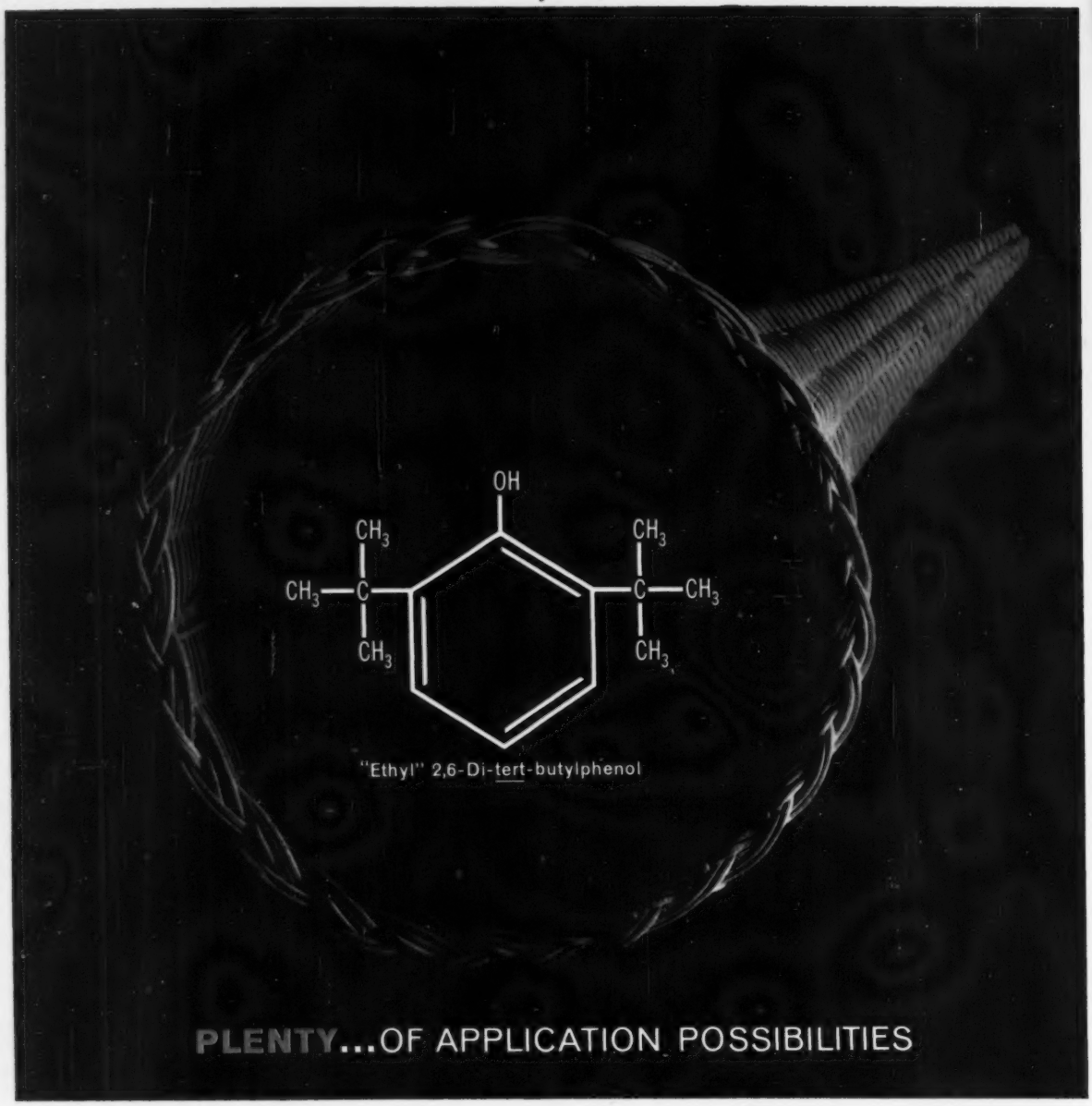

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ON THE COVER: Indian workers use bucket-brigade technique in construction of Union Carbide's polyethylene and chemical plant at Trombay Island. See Special Report, p. 65.

Chemical Week

Vol. 89, No. 12 SEPTEMBER 23, 1961

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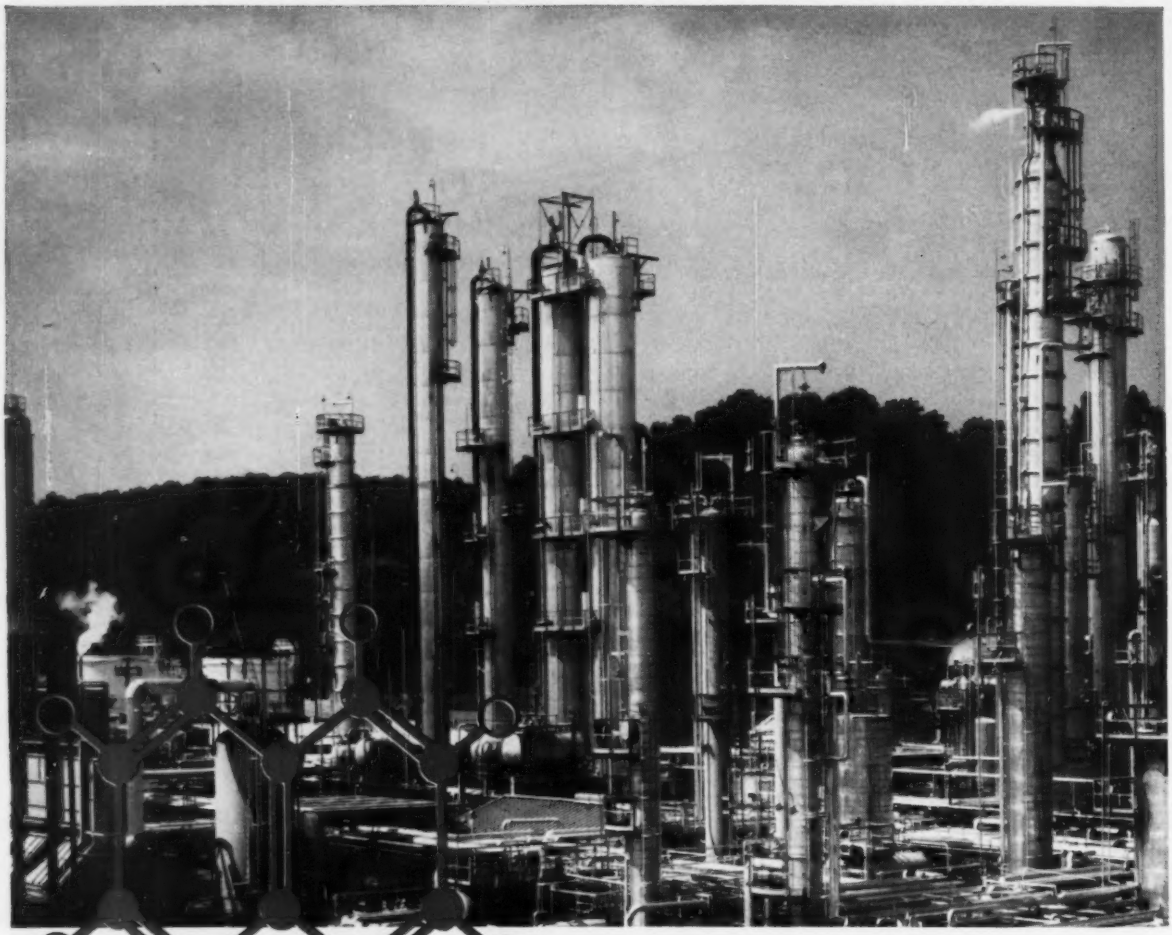

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Why Kill Drug Patents?

THE FOOLISHNESS of S. 1552, Senator Kefauver's bill to effectively kill pharmaceutical patents, is ably pointed up by the Drug, Chemical and Allied Trades Assn. in a letter to New York's Senator Keating:

" . . . The provisions of the bill which would amend the Sherman Act . . . are unnecessary. The Sherman Act already proscribes the conduct described in the bill if the effect of that conduct is to unreasonably restrain trade or create a monopoly. When such conduct does not give rise to these effects, . . . it should not be arbitrarily condemned. The *per se* condemnation of these practices would terminate legitimate methods of private settlement of contests that expedite otherwise lengthy proceedings in the Patent Office costly to the government and to the patent applicants. . . .

"Those provisions of the bill which seek to amend the Patent Law directly are of greatest significance and pose the most serious threat to the public interest. . . ."

"First, S. 1552 precludes the granting of a patent for any so-called molecular modification of any patented or unpatented drug or for a combination of two or more drugs unless the Secretary of Health, Education and Welfare has determined that the therapeutic effect of the modification is significantly greater than that of the drug so modified or that the therapeutic effect of such drugs in combination is significantly greater than the therapeutic effect of those drugs when taken separately. The practical effect of this would be to eviscerate the Patent Law as it affects prescription drugs. It makes the finding of significantly greater therapeutic effect prerequisite to the grant of a patent of invention. Such a rule leaves out of consideration the many other factors which mean progress in the pharmaceutical field, such as lower toxicity, lower dosage levels, improved dosage forms, greater stability, and sustained potency over longer periods of time. Moreover, it suggests that there is something fundamentally wrong with molecular modifications of existing chemical compounds, since it would deny patent protection to such modifications unless the specific conditions of the proposed statute are met. The annals of medicine are replete with examples of lifesaving drugs which represent only slight molecular modifications from existing chemical compounds which were ineffective medically. The anti-arthritic compound now known as cortisone is a molecular modification of Kendall's Compound A, a medically useless substance.

"Secondly, the proposed amendments to the Patent Law introduce for the first time the concept of compulsory patent licensing in this country. Specifically, these provisions would limit exclusive patent rights for new prescription drugs to a period of three years. For the remaining fourteen years, the patentee would be required to grant an unrestricted license to any qualified applicant or risk termination of the patent. In addition to the grant of a patent license, the bill would require the disclosure to each applicant of all technical information required for the manufacture of a drug. These provisions seriously challenge the underlying principle of the American patent system. The traditional patent right has been a potent stimulant to research and development in this country and has been a major factor in our progress. This feature of the legislation will hit hardest those companies who do the best research. In the case of those small companies holding a place in the market solely because they have patent protection on their discoveries, it would be devastating. In brief, the bill would penalize initiative and deteriorate the incentives for research and investment. . . ."

Producing Vinyl Foam?

Two new vinyl foam stabilizers just developed by Argus will facilitate your processing and improve your product. Here's why:

Both of these—Mark Q-139 for plastisols and Mark Q-146 for calendering—provide catalytic action that brings about rapid and complete decomposition of the blowing agent at the expansion temperature. Result: a vinyl foam of finer, more uniform cell structure. Both give complete protection from sulfide stain, and sufficient stability to the compound for ease in processing.

In calendering, Mark Q-146 provides enough stability to allow extended preprocessing at low temperatures and expansion at elevated temperatures. It also prevents premature decomposition of the blowing agent during banburying and calendering. Both Mark Q-139 and Mark Q-146 cost less, too, because they have a lower specific gravity than lead stabilizers.

Vinyl foam is only one of countless vinyl products that can be made better with Argus stabilizers and plasticizers. Whatever your problem, we'd like to hear about it. If the answer isn't in our line products, it's in our lab.

Argus Has the Answer

Technical bulletins and samples on request

ARGUS CHEMICAL Corporation 633 Court Street, Brooklyn 31, N.Y. Branch: Frederick Building, Cleveland 15, Ohio

Rep's.: H. M. Royal, Inc., 11911 Woodruff Ave., Downey, Cal.; Philipp Bros. Chemicals, Inc., 10 High St., Boston; H. L. Blachford, Ltd., 977 Aqueduct St., Montreal. European Affiliates: SA Argus Chemical NV, 33, Rue d'Anderlecht, Drogenbos, Belgium—Lankro Chemicals, Ltd.; Salters Lane, Eccles, Manchester, England.

LETTERS

Vehicular Smog Control

TO THE EDITOR: Your article "Gloom in Smog Control" (*CW, Sept. 2, p. 26*) quotes the writer as objecting, in behalf of Universal Oxidation Processes, to the 12,000-mile life requirement for California exhaust control devices. On the contrary, our company favors the 12,000-mile figure, considering it to be the practical minimum. Our objections were directed to proposed language specifying performance during shorter periods within the 12,000-mile life span.

According to the generally accepted mechanism for smog formation, vehicles do not emit smog as such. Rather, a large population of vehicles operating locally and emitting exhaust gases over extended periods supplies smog precursors to the atmosphere where the photochemical smog-forming reactions occur. On this basis, the control of smog depends on effecting a reduction of the over-all amounts of pollutants emitted by the total vehicle population rather than the detailed policing of each . . . vehicle.

We consider that a specification of average performance throughout a reasonable life period, such as 12,000 miles, should be adequate to assure the desired atmospheric concentration reduction of automotive exhaust-derived pollutants. Regulations as to performance over shorter periods are considered by us to be of doubtful utility and unduly restrictive.

It was this point of view which I attempted to convey in my statement to the California board.

JAMES R. BRITT
Universal Oxidation Processes, Inc.
Los Angeles, Calif.

Space-Age Metal

TO THE EDITOR: [*CW Washington Newsletter, Sept. 2*] contains some comments on beryllium . . . of interest to all concerned with this space-age metal.

We have, of course, been aware of the important progress being made at Franklin Institute to increase the ductility of beryllium so that it may be used as shielding material in rockets and supersonic planes. Confirmation of this in CHEMICAL WEEK is heartening to all interested in fullest possible use of beryllium.

This same report, however, quotes anonymous "government metallurgists" to the effect that "no one has found any practical, economic method of refining beryllium" from domestic ore. We at United Technical Industries have great confidence in the abilities of government metallurgists. However, we know that you and your readers will agree that confidence is stretched too far when we are expected to believe that these . . . metallurgists are able to come to a conclusion about beryllium-oxide produced from domestic ore when none has . . . been submitted to them for analysis.

CHEMICAL WEEK and other technical and business publications correctly reported recently that United Technical Industries and Beryllium Corp. are engaged in a joint venture to produce BeO from domestic ore. [A] plant is in operation in Delta, Utah, and is in fact producing beryllium oxide from domestic ore. We have developed a practical and economic method of producing beryllium oxide from Utah ore.

For security reasons and to protect United Technical Industries' shareholders we have not yet released the details of our process to anyone, including government metallurgists.

While there is no question that imported beryl ore will be required, there is also no doubt that beryllium from domestic ore will become an important factor in the industry. Government metallurgists who will get the facts before being quoted anonymously will, we are persuaded, come to the same conclusions.

VINCENT A. DUFF
President
United Technical Industries
Murray, Utah

MEETINGS

University of Denver Research Institute, second rare-earth conference, Colorado Hotel, Glenwood Springs, Colo., Sept. 24-27.

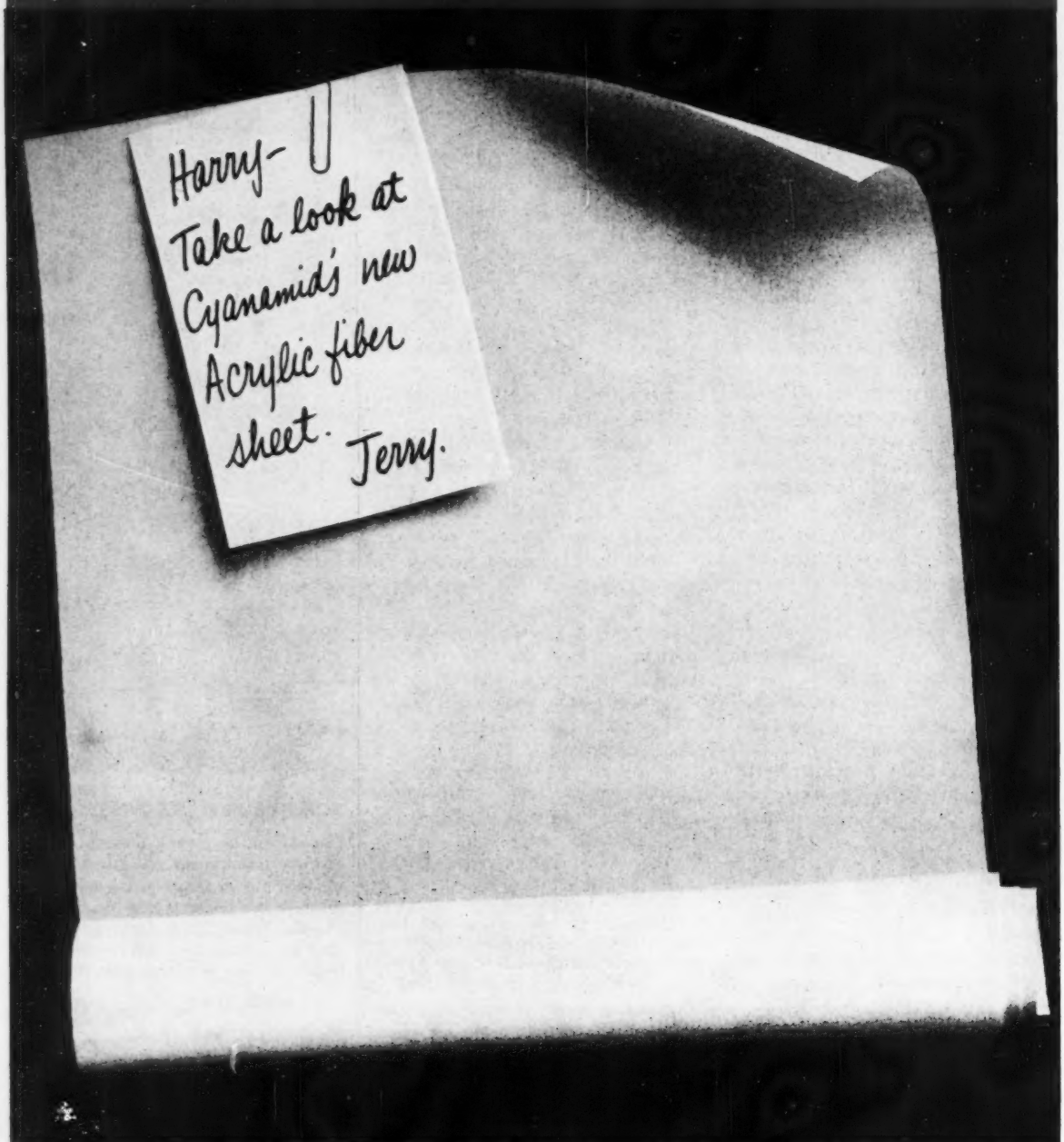
American Society of Mechanical Engineers, ASME petroleum mechanical engineering conference, Muehlebach Hotel, Kansas City, Mo., Sept. 24-27.

American Society of Mechanical Engineers, national power conference (ASME-AIEE), St. Francis Hotel, San Francisco, Sept. 24-27.

American Institute of Chemical Engineers, 46th national meeting, Lake Placid Club, Lake Placid, N.Y., Sept. 24-27.

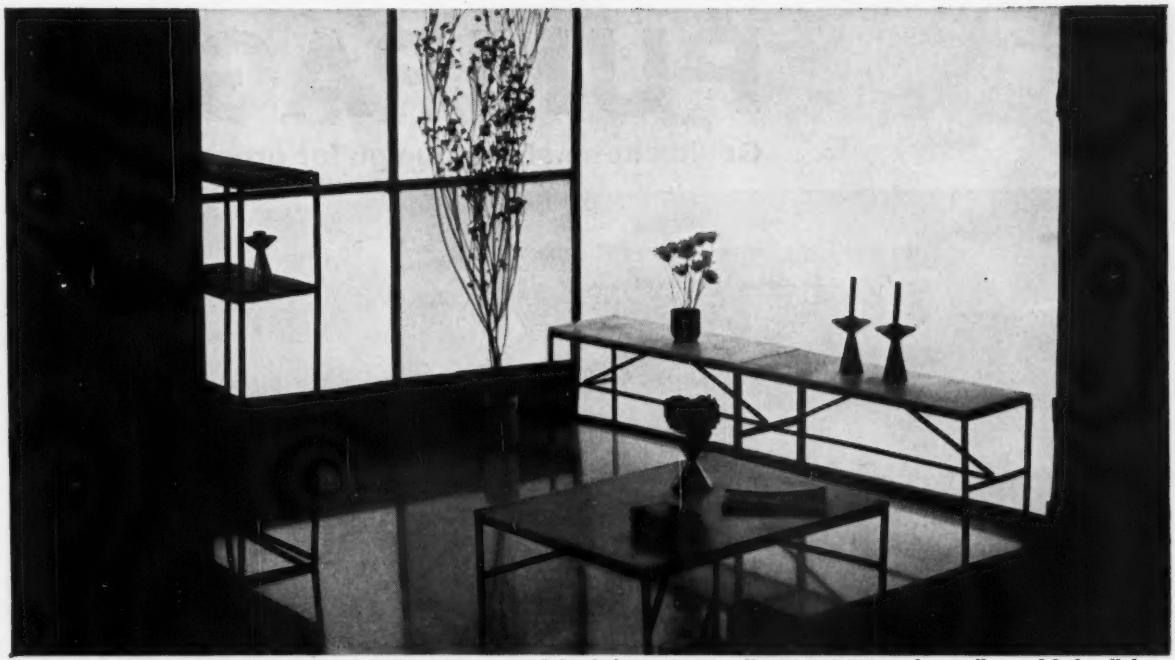
CYANAMID

Chemical Newsfront



NO BINDER NEEDED. This new 100% Acrylic Fiber Sheet is resistant to rot, common solvents, most chemicals, and ultraviolet light. It has good electrical properties and is compatible with most coating and impregnating resins. Its hydrophobic nature and resultant good dimensional stability makes this material adaptable to a wide range of new uses. Use the coupon for detailed information.

(Paper Chemicals Department)



ELECTROLUMINESCENCE: TOMORROW'S LIGHT. The newest word for light is Cyanamid's CYANOCEL* chemically modified cellulose. A cyanoethylated, highly refined cellulose, CYANOCEL is the most efficient dielectric carrier for the filling in the "light sandwich" that makes possible lights without heat, glare or moving parts. In the future, it may be fabricated into walls, ceilings and even curtains to give a cool, uniform light. The picture above shows miniature furniture set up before 10 x 14" GE panel lamps.

*Trademark

(Petrochemicals Department)

UNLOCKING POLYMER INSOLUBILITY. Thanks to copolymerization with Cyanamid's N-t-Butylacrylamide (t-BAM), vinyl monomers (whose polymers are ordinarily incompatible with alcohol) can produce polymers which are alcohol soluble. Such resins containing t-BAM can be applied from alcohol solutions—even in spray-can formulations. t-BAM is available commercially as a free-flowing wet cake or as a dry powder. (Market Development Department)

WHITE BUTYL RUBBER—THANKS TO PRONAR. Cyanamid's new PRONAR* butyl rubber modifier is a highly-active, non-discoloring, low-cost modifier that makes possible the heat treatment of white and light-colored butyl. Possible applications: in white side walls, housewares, wire and cable. For the full PRONAR story, send for Cyanamid's booklet by checking the appropriate area on the coupon.

(Rubber Chemicals Department)

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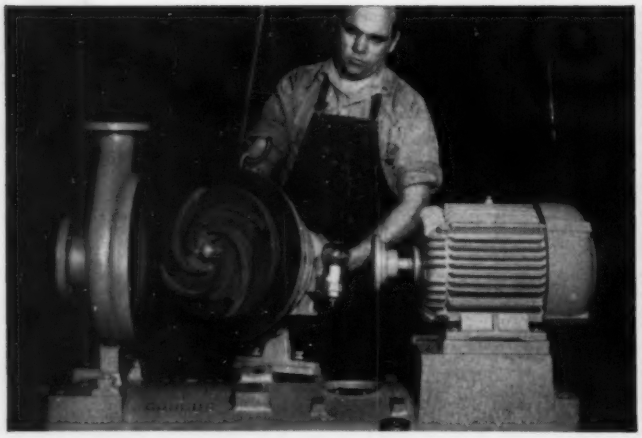
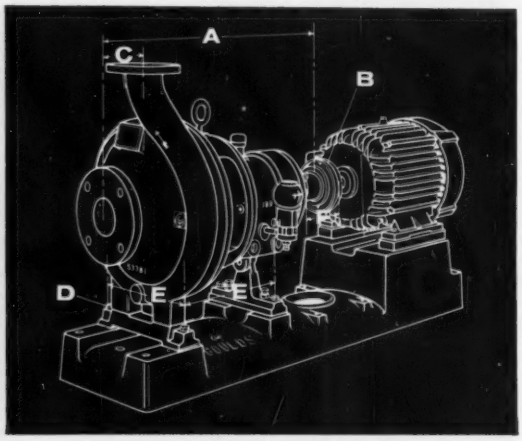
PUMPAGE

Goulds news about pumps for process industries





Standardized design features

Model 3195 gives you the greatest range of coverage and flexibility—with minimum parts needed—of any design on the market.

To meet varying service conditions, you can mount any one of the 11 pump ends to any one of three bearing frames (shafts 1¼, 1¾, and 2⅛ through stuffing box). Nominal impeller diameters of 6″, 8″, and 11″ cover the range. Capacities to 775 G.P.H., heads to 300 ft. TDH. Handles liquids up to 500°F.

Dimensional interchangeability between all Model 3195 pumps

With this top-centerline, broad-coverage design, you can interchange pumps without making expensive piping changes. It has

A One over-all length in all sizes..... 23″

B One coupling fit for all sizes..... 1⅛″

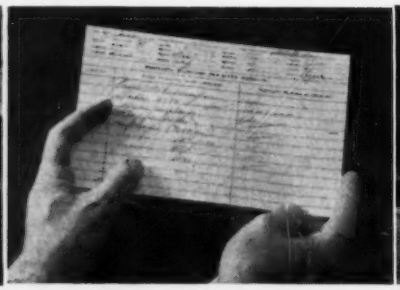
C One dimension end from suction to centerline of discharge..... 4″

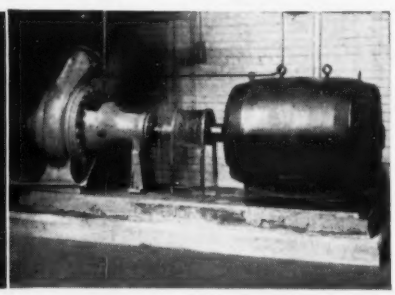
D One bolt size for holding pumps to bases..... ½″

E One bolt spacing for holding all pumps to bases

F One spacer coupling length for all sizes..... 3½″

Back pull-out design lets you easily replace parts most subject to wear without disturbing pipe connections or motor mountings. For full information, write for Bulletin 725.1.





How to dewater a flood

Deep in a Virginia mine, water that could fast become a flood is being pumped out at as much as 8000 gpm for New Jersey Zinc Company.

More than a generation of miners has grown up since the first of the pumps started working. Yet these pumps, as well as the newer ones, perform so dependably that four more are slated to join them.

All 30 are Goulds single-stage, double-suction centrifugals. All use mechanical seals. All are grease lubricated.

Easy way to diagnose pump failure

Keep complete maintenance records on easy-to-use cards. Failures show chronologically, making it easier to get at the root of the trouble.

Cards are a help in ordering new parts, scheduling lubrication, and in determining pump suitability for new requirements due to process change.

Like a free supply of these pump maintenance record cards? Drop us a line. For information on this, or other products on this page, write Goulds Pumps, Inc., Dept. CW-91, Seneca Falls, N.Y.

Unique-alloy pump fights abrasives

The first pump in the system at Bestwall Gypsum Company's Pryor Mill works on a particularly tough service. It must handle bits of metal and glass the junk remover doesn't get.

It's a Goulds Model 3139 constructed of ISO-40.* This stainless steel alloy, highly resistant to corrosion and abrasion, has BHN hardness of 320 and tensile strength of 140,000 psi.

Do you have a similar severe application problem? Let us know. ISO-40 is available in several of our designs.

*Registered trademark of Empire Steel Castings, Inc.

GOULDS GP PUMPS

PARSONS RECONSTRUCTS FOR SIGNAL OIL AND GAS

This Thermofor Catalytic Cracker for Signal Oil and Gas was moved from Signal Hill and reconstructed at the Bakersfield Refinery by Parsons. In updating the TCC unit, its capacity was increased from 6,000 to 8,200 BPD.

Also as part of this project, Parsons designed, handled detail engineering, procurement, and construction of a Catalytic Reformer and Desulfurizer for the Bakersfield Refinery. For design, engineering and construction always...

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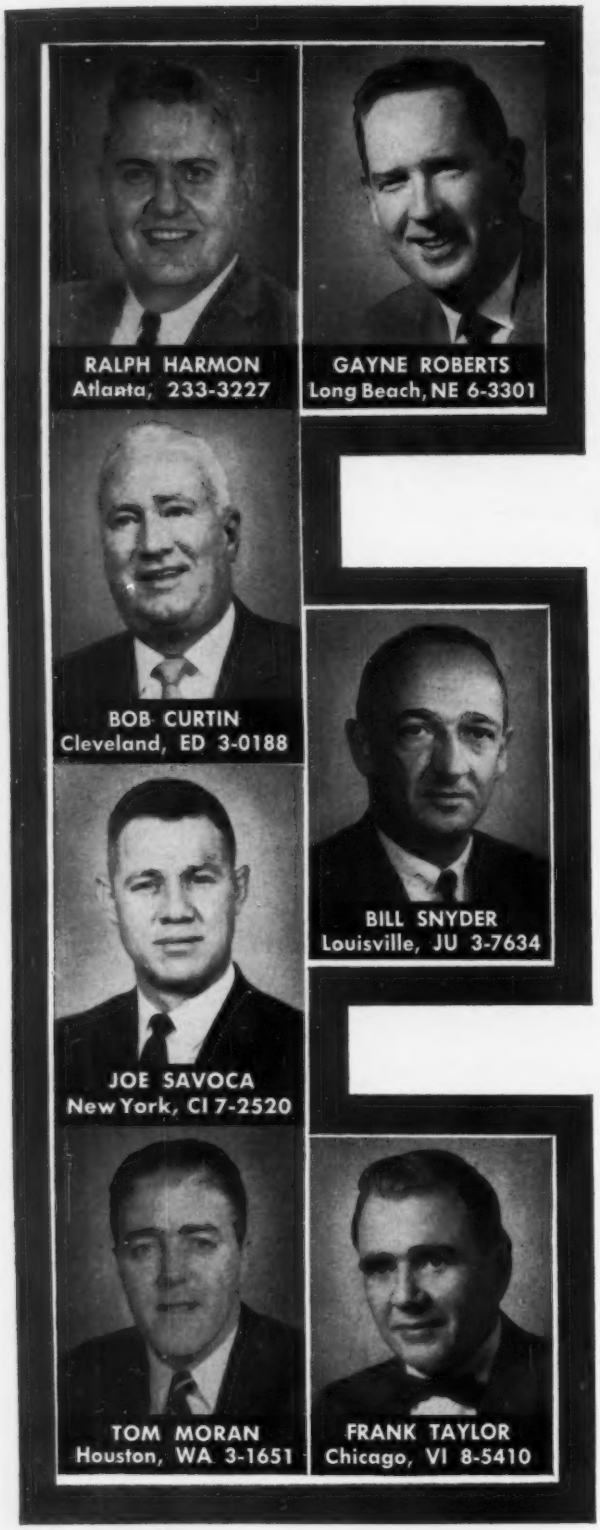

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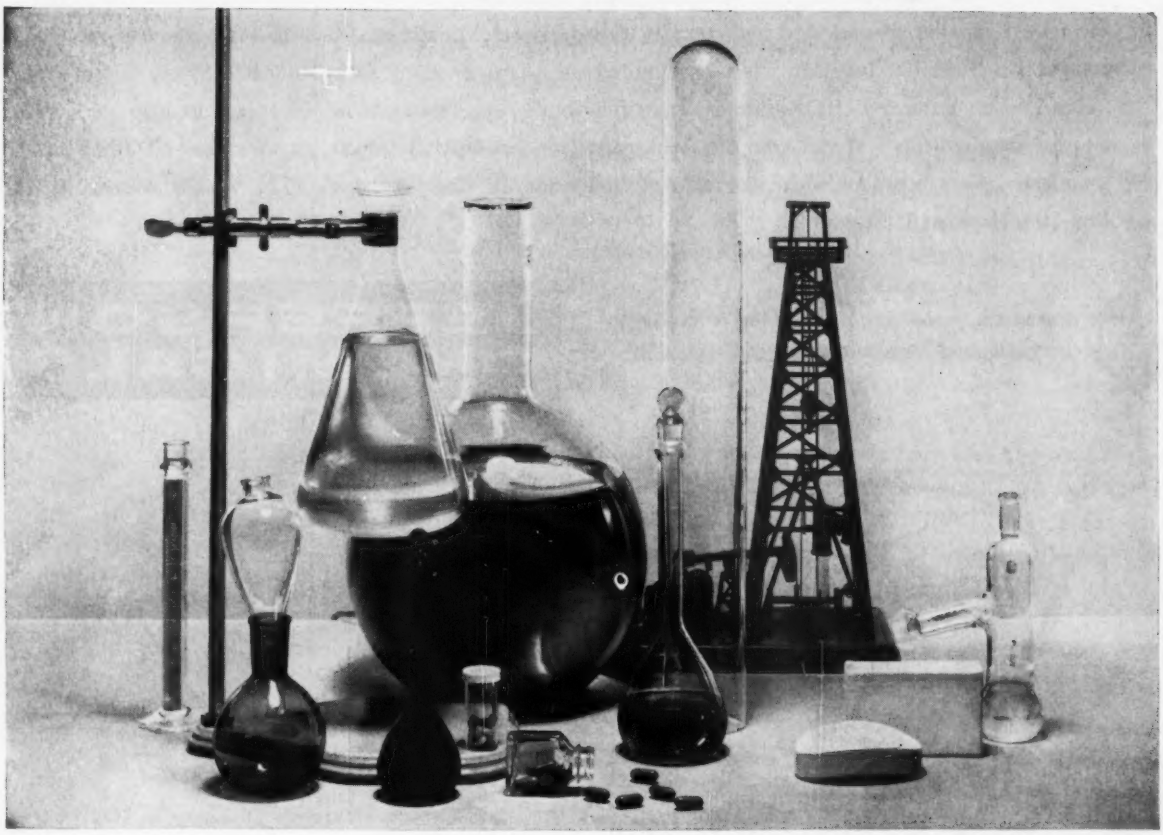

Diamond Crystal Rock Salt, mined at Jefferson Island, La., one of the world's purest deposits, results in consistently better end products without the costly side reactions of impurities found in less pure salt. The reason? Diamond Crystal Rock Salt is 99% pure at its source.

Diamond Crystal Salt Company is one of the country's leading producers of quality salts for all industries. Through modern research laboratories and product development projects, Diamond Crystal Salt Company has kept abreast of the Chemical Industry's great strides forward. As a matter of fact, Diamond Crystal is the largest shipper of Rock Salt by barge on the inland waterways. And, if called upon, Diamond Crystal Salt Company could furnish all the quality salt requirements for the entire Chemical Industry.

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JEFFERSON CHEMICALS

Business
Newsletter

CHEMICAL WEEK
September 23, 1961

The steel industry is just about unanimous in its rejection of President Kennedy's recent request to hold the line on prices when wages go up Oct. 1. Tenor of the generally bristling replies: market, not political, considerations will determine future pricing of steel products.

But the President and his economic experts aren't giving up in their efforts to keep down steel prices, prevent a feared "inflationary" cycle. Among the inducements being offered steelmakers, officially and otherwise: promise of White House pressure against "extravagant" steelworkers' wage demands in '62; an indication that the Administration may not protest too much a few selective price hikes later in the year.

This is how things will likely work out: there will be no across-the-board steel price boosts this year, but some products will rise to allow the industry to at least partly offset next month's pay increases.

•

Resumption of U.S. nuclear explosion tests late last week—first since Oct. 30, '58—makes it certain that Project Plowshare will get a government go-ahead signal *(CW, Sept. 16, p. 25)*. In revealing the underground nuclear weapons blast at the U.S. test site in Nevada, the President also mentioned that the programed series of tests will promote the use of nuclear explosions for peaceful purposes.

•

Pipeline propane for polypropylene. Texas Eastman, division of Eastman Kodak, will build a 275-mile pipeline to ship propane to its Harrison County polypropylene plant near Longview, Tex. Material will come from Phillips Petroleum's salt dome storage cavern in Brazoria County, Tex.

The line, when completed by year's end, will be able to carry more than 20,000 bbls./day of propane.

•

Oxygen for Du Pont's new methanol operations (*CW Business Newsletter, Sept. 9*) near Huron, O., will come from a new Air Reduction plant. The $3-million unit, with a production capacity of more than 250 tons/day of high-purity oxygen, will be Airco-built and operated on property leased from Du Pont adjacent to the methanol plant. Construction will begin next month, operation is slated for last-quarter '62.

More than 25,000 cu.ft./minute of air will be processed at the plant to separate oxygen by low-temperature (cryogenic) methods. The tonnage plant will also turn out some nitrogen to be used by Du Pont.

•

Du Pont may build a titanium dioxide plant on the West Coast. The project is only in the exploratory stage, and various plant sites are being "investigated." If the unit is built, the company will use its new chloride

process to make the pigment (*CW Technology Newsletter, Sept. 9*). At present this process is in use at plants at New Johnsonville, Tenn., and Edge Moor, Del.

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Thiokol, big in missile and rocket fuel programs, is shopping for several commercial chemical companies to fit into its expanding chemicals operations. Possibilities include paint and industrial plastics manufacturers. At present the company's chemical division develops, produces and markets liquid polysulfide polymers (synthetic rubber in liquid form), crude rubbers, rubber chemicals, and urethane foaming and casting resins.

•

About $3.2 million will be invested in new chemical plants in Mexico by Reichhold Chemicals. Aim of the expansion program (over the next three years) is to establish Mexico as the technical and service headquarters of RCI's Latin American operation.

The company's wholly owned subsidiary, Reichhold Chemicals de Mexico, S.A., will build a complex of four plants outside Mexico City, possibly at Cuernavaca, Morelos. Plans are flexible, but now call for manufacture of phthalic anhydride, formaldehyde, plasticizers, synthetic resins, and probably two other products as yet undisclosed.

•

The Cubans, with Soviet Union help, are pushing plans for production of metallic nickel and cobalt at Moa Bay. Under Freeport Sulphur operation, the plant turned out unfinished products that were shipped to Louisiana for further processing.

Plans for expansion of present installations will be completed next year, and Leningrad specialists will complete blueprints for an entirely new nickel plant by '63. Also in the works is a giant thermal power station to supply electricity for the nickel and other "establishments" in Oriente Province.

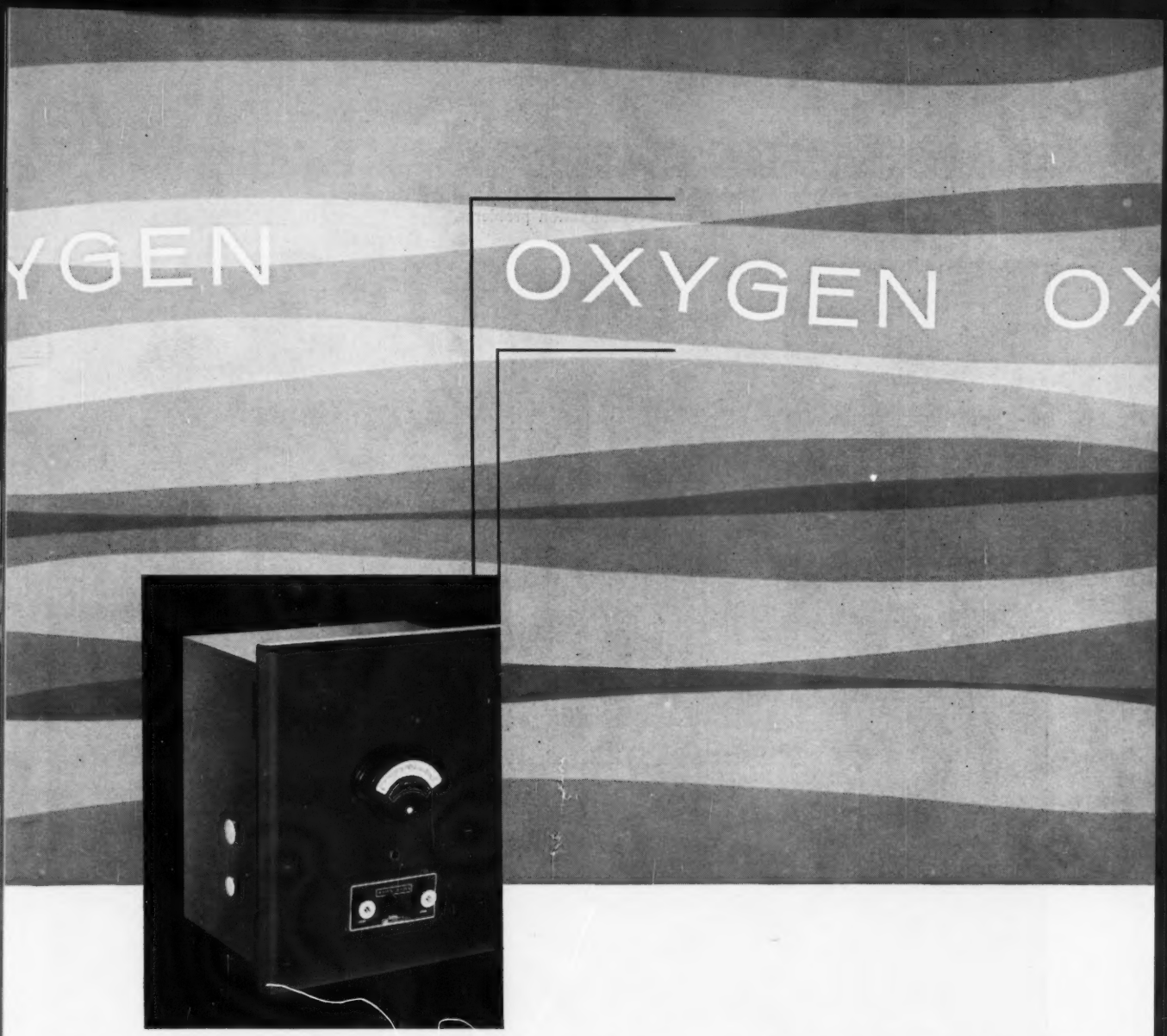
•

Petrochemicals for Yugoslavia. Backed by $23 million in credits from undisclosed American sources, Yugoslavia plans to build its first petrochemical plant near the Struzec gas and oil fields. The complex, due for completion in late '63, reportedly will produce 31,000 metric tons/-year of polyethylene, styrene, polystyrene and acetone.

•

Imperial Chemical Industries' first full-scale plant for production of a new high-tenacity polypropylene filament yarn will be onstream by year's end. The 5-million-lbs./year unit (at Wilton) will be augmented, when needed, by additional facilities at the company's new Kilroot, Northern Ireland, site.

Montecatini granted ICI the British manufacturing and sales rights for polypropylene filament yarns in Aug. '60.



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Beckman has the instrument that's made to order for your oxygen measurement application. For Beckman has the most complete line of Oxygen Analyzers from which to choose. Measure 0_2 in ranges from parts per million to 100%–with sample handling equipment to meet your most exacting requirements.

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Beckman INSTRUMENTS, INC.

SCIENTIFIC AND PROCESS INSTRUMENTS DIVISION

Fullerton, California

Sea of oil-coated drums strewn across Texas City road typifies cleanup problem in hurricane's aftermath. Damage within plants generally was not severe. But people faced heartbreaking home-rehabilitation problems.

CW PHOTOS BY BERT BRANDT

CPI Cleans Up After Carla

This week, the chemical industry on the battered Texas Gulf Coast was nursing its bruises but was back at work following its grim battle with hurricane Carla. The problem mainly involved people—how they would divide time between plant and home.

Plant crews in many areas had been ordered away from the low-lying coast before the storm hit. Once the worst was over, cleaning-up, checking-out and starting-up of equipment had to begin as quickly as possible to hold the biggest industry loss—production downtime—to a minimum.

Crews, particularly maintenance men, were in critical demand. Telephone lines were jammed as men tried to report their whereabouts and obtain instructions. Elsewhere, reporting for work was slowed by flooded highways and roadblocks.

And plant crews needed help at home. At Freeport and Port Acres, homes were still sitting in several feet of water four days after the storm. In other areas homes were filled with mud and slime. Men needed money, advice, understanding—and most of all, time to set things right.

SOLDIER at roadblock near Carbide's Texas City plant permits workers with passes to enter town, turns back sightseers. Typhoid shots were given to returnees because most water supplies had been contaminated. Children were not permitted entry for the first few days. Three days after the storm Carbide reported that 1,000 workers had returned, were being called for the afternoon shift as needed. Texas City plants were aided in recovery by detailed emergency procedures tested over years (*CW, July 27, '57, p. 26*).

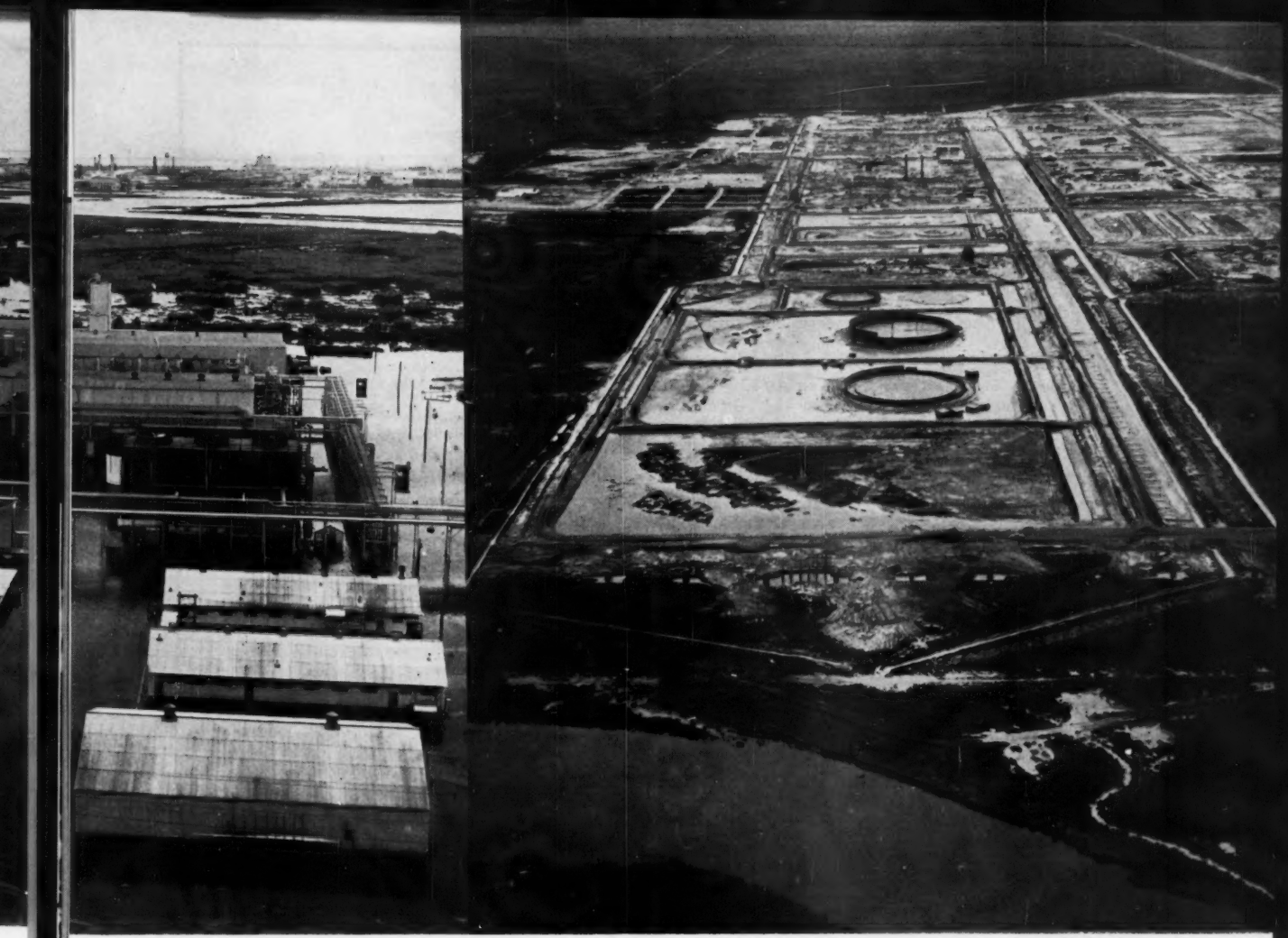
TEMPORARY OFFICE is set up two days after storm by Monsanto management-clerical team in Bank of Mainland at La Marque, just outside Texas City. Workers received pay, emergency kits, passes to get them by roadblocks and instructions that sent them to plant or homes. Bank stayed open till late at night for check cashing. Carbide paid workers directly in cash. La Marque, on higher ground than Texas City, received less battering and maintained its fresh water supply uncontaminated throughout entire storm.

CLEANING UP his Texas City dwelling, B. E. Drane, project engineer at Monsanto's division engineering department, is helped by sons, Sam and Bill. "I'd like to have locked the door again and thrown away the key," said Drane on viewing home two days after the storm. But next day he and the boys began cleanup, slipped, slid and skidded across warped floors covered with slime left by Gulf water. They carried sodden furnishings outdoors to bake in the sun, wondered if stench of the muck would ever disappear.

A PARALYZED GIANT was Dow's Freeport complex (*above, left*), on the 3 o'clock side of the storm center. Winds sweeping around in a counter-clockwise direction picked up the Gulf and dropped it into the lap of the plant. When the dike broke during the height of the storm, Dow's Plant A went under 4 ft. of water. Plant B, on higher ground, was only partially flooded. Four days after the storm, most areas of both plants had drained. Lights began twinkling on some process units and wisps of steam were pushing their way up into an overcast sky. Flooded Koppers plant (*above, center*) at Port Acres, near Port Arthur, points up storm-damage irony. Although the plant is almost

A vantage view of

PACING SEAWALL beside battered ship at Texas City, armed National Guardsman (*left*) views a strangely silent chemical industry in the background. Patrolling Guardsmen kept would-be sightseers and looters from the city while plant crews returned to work as they were needed. Three days after the storm, plants began coming alive. A few flares at the refineries were burning brightly and steam was hissing through traps, valves and lines opened by maintenance crews. As electricity was restored, wet motors and other electrical equipment were disconnected before the switches were



200 miles up the coast from where Carla's eye hit, it was covered by 4 ft. of water. Du Pont's Victoria plant and Carbide's Seadrift plant, which caught part of the eye, were almost undamaged. Plant elevation was a major factor. The Koppers plant, in a low-lying area behind Port Arthur, was inundated when the Taylor levee broke. And swollen streams prevented water from draining into Gulf. Construction work at Monsanto's Chocolate Bayou project (*above, right*) came through almost unscathed. Some concrete footings were covered with water, but helpfully showed engineers how much filling will be needed for final grading to keep plant dry during future drenchings.

CPI coming alive

thrown. On the high ground in most plant areas there was little outward evidence of flooding. But hard-pressed maintenance crews were wary of snakes forced out of the swamps by the storm. And in some areas, debris—floated over plant fences and trapped when waters receded—blocked access to equipment. Surveying the damage from aerial vantage point is *CW* Production Editor Herbert Short (*right*) who spent two days in the hurricane-stricken area. His eyewitness coverage of the CPI's first few days of recovery is reported on these pages. For box score of startup times, turn page.

How Badly They Were Hurt: Plant-by-Plant Rundown

Company	Plant	Shutdown Time	Startup Time	Principal Damage
Alcoa	Point Comfort	2 of 7 potlines operating throughout	Full operation expected by about 9/28	Water leaking into electrical systems
Alcoa	Point Comfort (alumina)	9/10	Not known	No flooding; winds up to 170 mph
Celanese	Bay City	Under construction	Spring '62	Minor damage to roofs, light fixtures
Celanese	Bishop	6 pm, 9/9	12 pm, 9/10; full operation by 9/15	Minor wind damage
Diamond Alkali	Ship Channel	8 am, 9/10	7 pm, 9/12	Flooding at intake station and docks
Dow Plant A	Freeport	9/9	About 9/27	
Dow Plant B	Freeport	9/9	About 9/27	Flooded to depth of 4 ft
Du Pont	La Porte	12 pm, 9/9	7 am, 9/12	Minor wind damage
Du Pont	Victoria	9/10	9/12	Almost no damage
Ethyl	Pasadena	TEL unit shut down 9/9	TEL unit by about 9/20	Some water damage to electric motors
Humble Oil	Baytown	Daybreak, 9/10	9/15	Silt washed into several pumps
Koppers	Port Acres	Noon, 9/9	About 9/28	Entire plant flooded to depth of 4 ft; electric motors must be rebuilt
Monsanto	Chocolate Bayou	Under construction	Mid-'62	Minor wind damage
Monsanto	Texas City	9/10	Soon as utilities restored	Some flooding; no substantial damage to equipment
Reynolds	Corpus Christi	Stopped tapping aluminum 6 p.m., 9/10	Resumed metal tapping 8 am, 9/12	Minor damage, estimated at about $25,000
Reynolds	Corpus Christi (alumina)	10 am, 9/9	9/12	
Rohm & Haas	Ship Channel	Noon, 9/10	Night, 9/12; full operation by 9/16	Minor damage, estimated at no more than $10,000
Shell Chemical	Deer Park	9/10	9/12; full operation by 9/15	Some wind damage to buildings; no damage to equipment
Sinclair-Koppers	Houston	No shutdown		Slight wind damage
Texas Butadiene	Ship Channel	12 pm, 9/9	Night, 9/12	Damage to equipment insulation
Texas Gulf Sulphur	Boling Dome	No shutdown		Minor damage to roofs
Union Carbide	Seadrift	6 pm, 9/10	9/14	Minor wind damage to buildings
Union Carbide	Texas City	9/9	9/13	Flooded to depth of 3 ft in some parts
United Carbon	Aransas Pass	9/10	9/15	Minor water damage

STARTUP SIGN: Three days after storm, tanker *Dow Chem* ties up at Dow's Plant A in Freeport to load. From flooded Port Acres near stranded Koppers plant, Southern Pacific sent a string of empty freight and tank cars through to Port Arthur to test rails. Most plants were anxious to start shipping to show there would be no break in supply.

For Steady Growth

Expansion by steady strides over a three-year period is planned by FMC Corp. (formerly Food Machinery and Chemical), the company revealed last week in a registration statement filed with the Securities & Exchange Commission.

FMC — with corporate offices in San Jose, Calif., and its chemical divisions headquartered in New York — is planning to invest $25 million in new plant and equipment this year and a like amount next year. Last year its capital spending totaled $23.4 million, of which more than two-thirds was spent for chemical facilities.

In its new financing FMC proposes a public offering of $30 million worth of convertible, subordinated debentures due Oct. 15, '81. This would increase the company's long-term debt 51.6%, to nearly $88.1 million; but long-term debt would still be less than 30% of total capitalization.

The new debentures are to be redeemable at the company's option at any date prior to maturity. Holders of the debentures will be entitled at any time prior to maturity to convert the debentures into FMC Corp. common stock.

Proceeds from the offering will be used: (1) to pay off $4 million worth of sinking-fund debentures due next March 15; (2) for expansion, modernization and new facilities for the company's chemical, defense and machinery divisions; (3) for additional working capital.

For the first six months of this year, the preliminary prospectus reveals, total chemical sales of $91.45 million included $30.3 million from insecticides and other agricultural chemicals; $25.6 million from phosphates, barium and magnesium chemicals; $21.15 million from alkalis, chlorinated chemicals and carbon bisulfide, $7.6 million from plasticizers and organic and fine chemicals; and $6.8 million from peroxygen chemicals.

FMC's chemical divisions now have 40 plants. The company's 90%-owned Intermountain Chemical Co. has trona deposits expected to last for more than 100 years; and its phosphate deposits include an estimated 30-year supply in Idaho and "substantial" additional holdings in Rich County, Utah.

Pulling Up to Previous Peaks

(All dollar figures in millions. Source: Federal Trade Commission, Securities & Exchange Commission.)

Industry	Sales 2nd qtr. '61	Sales Change from 2nd qtr. '60	Earnings 2nd qtr. '61	Earnings Change from 2nd qtr. '60	Profit-to-Sales Ratio 2nd qtr. '61
Chemicals and allied products	7,250	Up 1.8%	566	Up 1.3%	7.8%
Basic chemicals	3,339	Up 0.7%	284	Down 6.0%	8.5%
Drugs	1,007	Up 6.3%	91	Up 5.8%	9.0%
Petroleum refining and related industries	7,418	Up 1.9%	723	Up 14.4%	9.7%
Rubber and miscellaneous plastics products	2,169	Down 1.1%	91	Up 5.8%	4.2%
Pulp, paper and allied products	3,129	Up 6.0%	151	Down 5.0%	4.8%
Primary nonferrous metals	2,339	Down 0.2%	137	Down 2.8%	5.9%
Products of stone, clay, glass	2,410	Up 5.2%	165	Down 11.8%	6.8%
CPI Totals	**24,715**	**Up 2.2%**	**1,833**	**Up 3.9%**	**7.4%**
All manufacturing industries	**89,847**	**Up 2.0%**	**3,965**	**Down 2.8%**	**4.4%**

Rebounding–but Too Slowly

Chemical companies' profits are lagging by almost any standard, latest industry financial statistics show this week.

U.S. manufacturing industries as a whole snapped out of the recent recession by scoring a 36.7% increase in net income from the first quarter to the second quarter of this year. For producers of basic chemicals, however, the second-quarter gain from the recession's low-water mark in the first quarter was only 25.7%. This left basic chemical companies' second-quarter profits 6% below their year-ago peak, even though sales were higher (*table, above*).

Most other CPI branches were doing considerably better, according to the latest "Financial Report for U.S. Manufacturing Corporations," compiled quarterly as a joint project of the Securities & Exchange Commission and the Federal Trade Commission.

Producers of primary nonferrous metals raised second-quarter earnings 31.7% above their first-quarter low. Makers of rubber and miscellaneous plastics products hiked earnings 62.5% from the first quarter to the second quarter this year. And companies making stone, clay and glass products—aided by usual seasonal factors, as well as by the general economic recovery—ballooned their net income 275%.

For two segments of the CPI, profits turned downward from the winter to the spring quarter. The drop was 7.1% for companies in petroleum refining and related industries; for drug manufacturers, second-quarter profits were 5.2% less than first-quarter net. In both cases part of the dip can be attributed to seasonal factors.

Need for chemical corporations to stop the decline in profitability is underlined both by spring-to-spring and winter-to-spring comparisons. From the April-May-June quarter of '60 to the corresponding period this year, basic chemical corporations' sales increased $24 million but their profits declined $18 million. And in the recovery movement of the latest quarter, basic chemical corporations' profits climbed only 25.7% from the sluggish first quarter, with sales up 9.9%, while all manufacturing industries' profits shot up 36.7% on a sales gain of 8.8%.

Gearing for Chemicals

Ohio Oil Co. (Findlay, O.) is making new moves to build up its just-starting petrochemicals business.

Last winter Ohio took its first step into petrochemical production by signing an agreement to supply 20 million gal./year of benzene-toluene mixture to Dow Chemical (*CW Business Newsletter, Feb. 25*). The aromatic mixture will be produced at the Detroit refinery of Aurora Gasoline Co., a wholly owned subsidiary of Ohio.

Now company President J. C. Donnell II is moving ahead on other chemical operations. He is putting Vice-President W. H. Barlow in charge of Ohio's chemicals, planning and research organization, and is setting up a new chemical product development division that will be headed by R. H. Reitsema, a senior planning associate.

Increased staff and facilities at the company's Denver research center will give greater emphasis to petrochemicals, probably lead to a tripling of Ohio's efforts in this field.

The new chemical product development division will be headquartered in the company's home offices at Findlay. Its task: to propose and develop new or improved products, and to carry forward the initial stages of manufacturing and marketing.

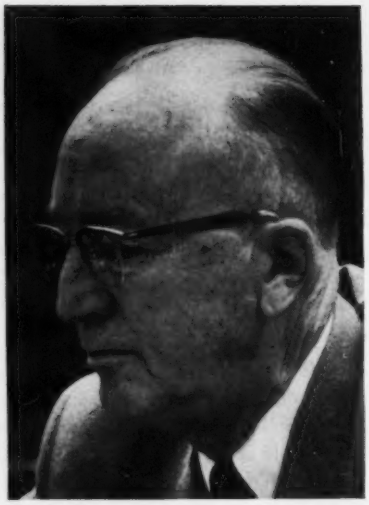
More Power by '70

Greater assurance of a continuous supply of electric energy—that's the outlook for the CPI by '70 as a result of expansions in transmission facilities planned by the nation's private utility companies.

Edison Electric Institute President Philip A. Fleger (also president and board chairman of Duquesne Light Co. of Pittsburgh) reports that private companies will invest $8 billion in transmission facilities over the next decade, more than doubling present total investment.

"By '70 we expect all major power systems to be capable of operating on an interconnected basis throughout the U.S." Fleger states.

Many of the new lines will operate at 345,000 volts; some will be designed for later conversion to 500,000 volts. Expansion plans are the result of a two-year study of power needs.



Dow's Doan: Relying on plant-by-plant cost-cutting for gain in '62 earnings.

Sales Even, Net Rising

Dow Chemical is banking on its efficiency improvement program, rather than a possible rise in volume of business, to bring home an increase in net profits in the fiscal year ending next May 31, President Leland I. Doan told stockholders last week.

"The much heralded boom of the 1960s is not making very much noise as yet," Doan said. "Business seems to be on a plateau. There is still much idle capacity in the country and severe pressures on the economy. . ."

Dow, he added, is "about holding even with last year." But for this fiscal year as a whole, Doan expects "a moderate increase in sales, and probably a somewhat better increase in profits because of the economies we are managing to achieve." He said these economies ranged from a $15,000/month profit improvement for the plant at Allyn's Point, Conn., to improvements of $5-10 million/year for the Texas and Midland divisions.

Some of the additional income will "help to offset rising costs that are beyond our control," Doan told the approximately 400 shareholders attending the 64th annual meeting in Midland, Mich. Much will be needed for market development in Dow's program to move closer to both individual and industrial consumers. And some of the gain in earnings will be paid out in the recently increased cash dividends.

Building in Corn Belt

Another nitrogen fertilizer producer is spotting a new plant in the Midwest corn belt, where the market growth is high. Monsanto Chemical has picked a site four miles south of Muscatine, Ia., on the Mississippi River, for a 200-tons/day ammonia plant that's scheduled to come onstream in autumn of '62.

This new plant—to be built adjacent to a 15,000-tons-capacity anhydrous ammonia storage terminal that Monsanto now has under construction—will be midway between two other nitrogen fertilizer plants going up on the Iowa shore of the Mississippi. It's about 70 miles upstream from Fort Madison, Ia., where California Chemical is building a $22-million nitrogen fertilizer complex (*CW, Dec. 3, '60, p. 25*), and about 70 miles downstream from Clinton, Ia., where Hawkeye Chemical plans to build an ammonia and derivatives plant (*CW Business Newsletter, Aug. 26*).

Monsanto's Agricultural Chemicals Division is already a large-volume producer and marketer of ammonia, with plants at El Dorado, Ark., and Luling, La. Divisional General Manager Tom K. Smith, Jr., says the new plant will enable Monsanto to improve its service to anhydrous ammonia stations throughout Midwest farming areas.

Next Step: Plastics

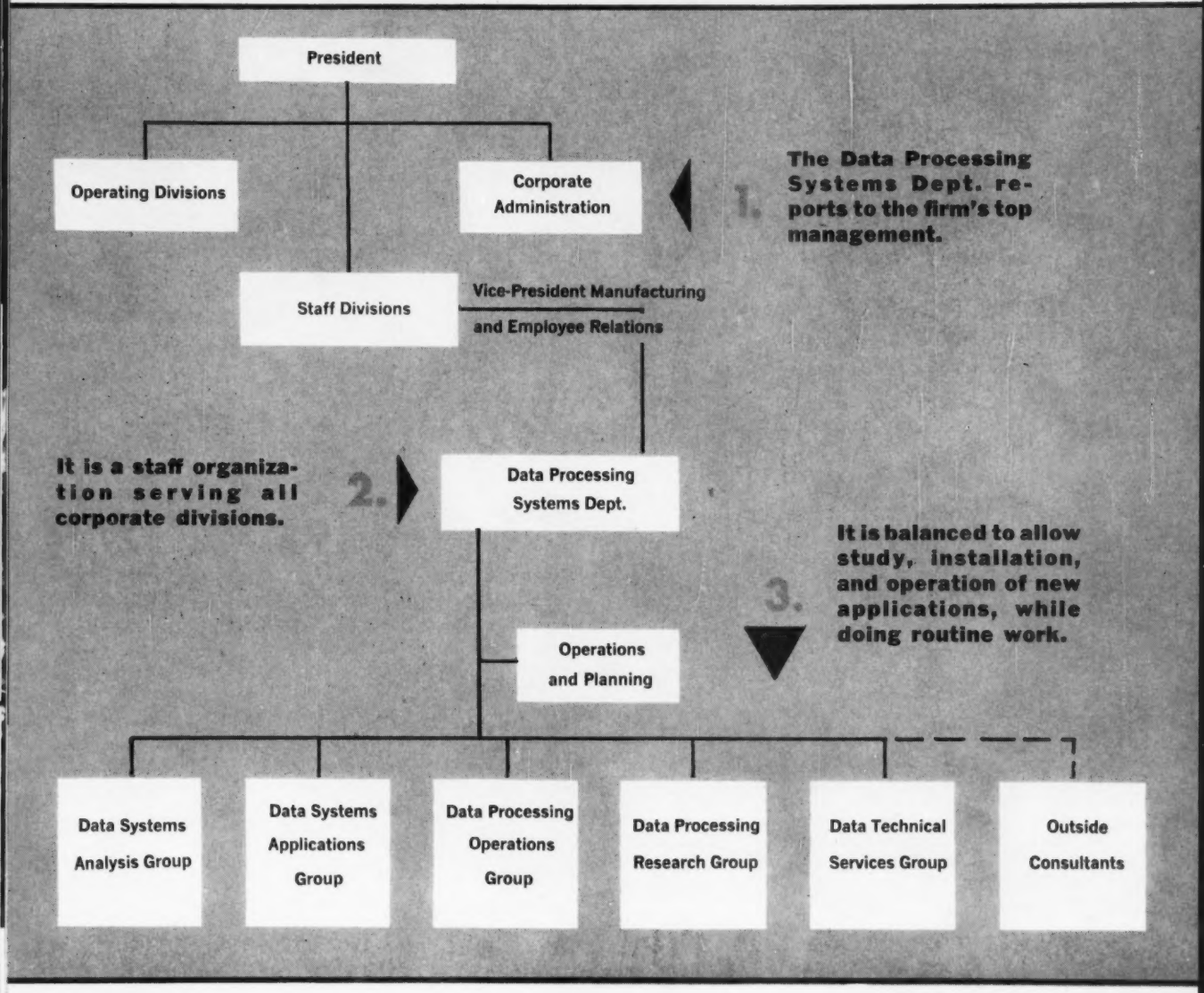
Atlantic Refining Co. is continuing its growth in chemicals by acquiring majority interest in J. P. Frank Chemical & Plastic Co.

Frank (Brooklyn, N.Y.) produces polyvinyl chloride and copolymer resins, films and sheeting, polyethylene film, plasticizers and stabilizers.

Atlantic (Philadelphia) operates chemical and petrochemical units, including a 63,000-tons/year anhydrous ammonia plant, in conjunction with its refineries at Philadelphia and at Port Arthur, Tex. Also at Port Arthur, a 50-million-gal./year benzene, toluene and xylenes plant—jointly owned by Atlantic and Pure Oil Co. —will be onstream by year-end.

Atlantic is devising and improving hydrodealkylation processes for production of naphthalene and other cyclic compounds from petroleum (*CW Technology Newsletter, March 4*).

P & G's Route to Data Processing Profits



Upping Data Processing's Payout

Chemical process companies whose investment in computers and data processing may be yielding slim returns, can take heart in Procter & Gamble's experience. This week, P&G estimated that its corporate data processing program will save the company over $2 million by the end of the year. But it didn't break even until '60, after being in the red since '57.

Much of this saving is the result of P&G's use of a corporate data center to speed the processing of orders emanating from its sales offices in central U.S.

Logically, P&G will now extend this service—first to its branches in eastern U.S., later to all offices—in the expectation of further savings. Other commercial uses (e.g., wage rolls, stock transfer) also account for sizable savings.

The first extension, which was completed this year, is a small regional center in Baltimore.

Profit Formula: Operating the data-processing systems department (*chart, above*) headquartered in P&G's Cincinnati general offices costs about $1.5 million/year. This includes rental of computers (e.g., IBM 705 III and 1401) and salaries (50 staffers). The computers at the corporate data center are used about 20% for order-shipping-billing; 50% for other commercial uses; 30% for research, engineering development, other special projects.

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Maintain flexibility in your operations by removing all uncertainties about availability of oxygen for your chemical process requirements. Buy oxygen as a tonnage pipeline chemical commodity — let Airco build and operate a plant for you.

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let Airco build and operate a plant for you

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ASSURED LOW COST. Your oxygen is available fast . . . at a firm contractual price that reflects the economies provided by Airco's large resources and long experience.

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P&G deducts new data-processing costs from the reduction in cost of each job as done by previous means (e.g., manual vs. computer preparation of payrolls). Other savings, such as lower inventory requirements resulting from faster order handling, are also figured in the total. Intangible savings — e.g., increased speed and accuracy, plus the system's value in scientific jobs—are not assigned a dollar value.

To insure discriminate use, charges for data processing are made to the departments that use it.

It's P&G's heavy emphasis on commercial uses of known payout that accounts for the Data Processing Systems Dept.'s profitability, according to manager Chester Swanson. The firm stressed commercial application from the start.

Back in '54, an early era in data processing, computers found enthusiastic users who put them to work in jobs for which they were particularly suited, as in the routine massive arithmetic required by insurance companies. However, some chemical process companies explored their possibilities in research, other technical applications, only to become disillusioned at the cost.

Until '54 P&G was putting only about $15,000/month into data-processing rental—a small sum for such a giant ($1.5 billion sales, $106 million net in fiscal '61) maker of detergents, soap, toiletries and foods. One reason for conservative P&G's reluctance to plunge into data processing: it wasn't sure where to begin.

In '54 P&G made its move, assigned responsibility for the newly conceived Data Processing Systems Dept. to Swanson and established reporting lines directly to top management. Swanson reports to James Ewell, vice-president of manufacturing and employee relations, who heads several other divisions. The department's "charter" specifies that its responsibility would cut across all divisions.

'Total Systems Concept': Ewell recalls. "We determined at the outset that we would enter the field only in those areas offering a definite return. This does not mean that we necessarily chose the study that promised the greatest returns as our first order of business. Rather, we did a great deal of studying to determine which over-all areas would prove to be the most rewarding and then determined which subsystems in these areas would prove to be the basic building blocks upon which the entire system might be constructed. Today we find that our applications are, on the average, yielding very satisfying net savings."

This approach suggests the "total systems concept" envisioned by some as the ultimate linking of all management functions to data processing to facilitate decisions by top management. But Ewell avers that an all-encompassing system — including P&G, its suppliers, customers and the government—would be too big to deal with effectively. "As yet we in P&G do not know enough to study —let alone install—such a system," Ewell observes.

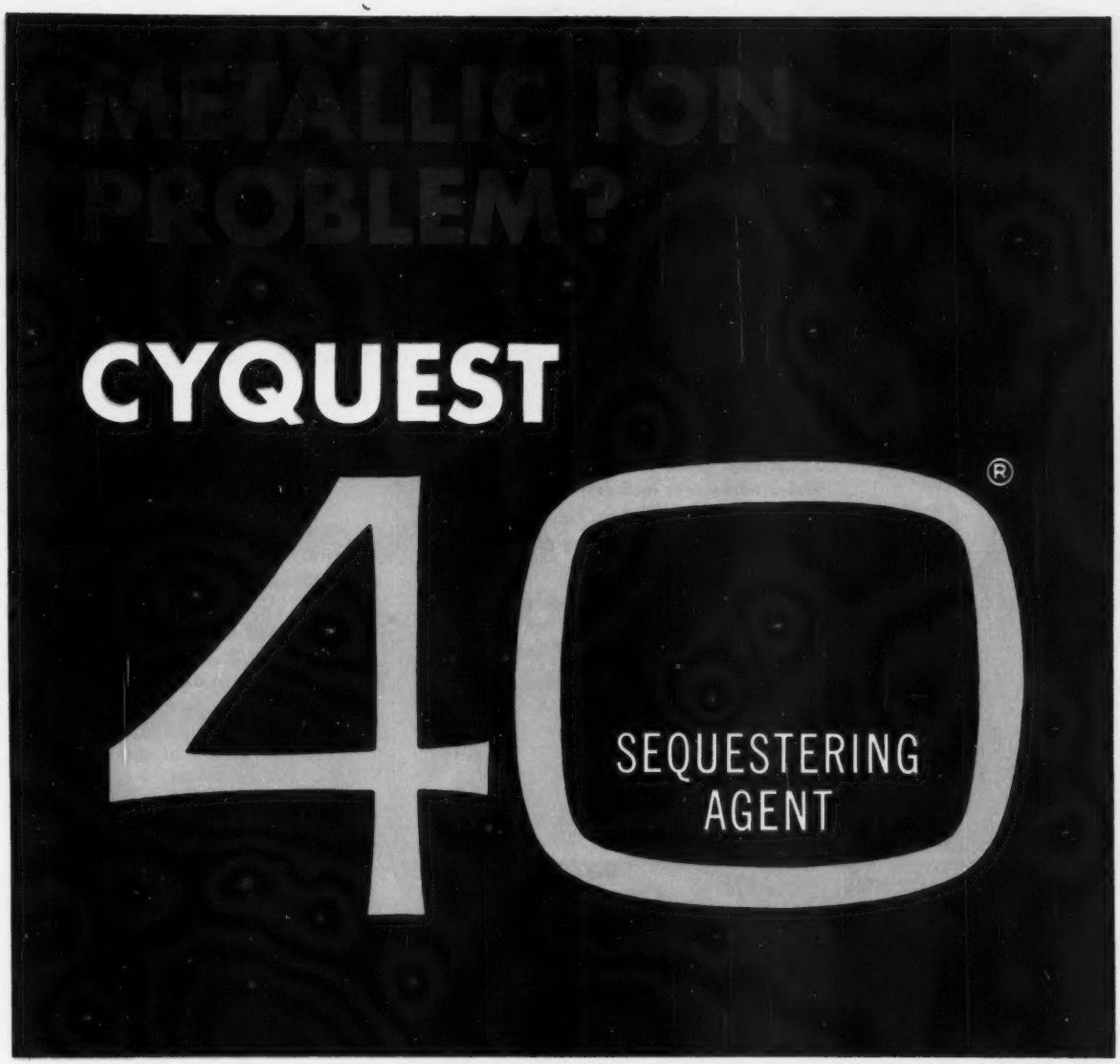
Some companies are more ebullient than P&G about the total systems approach. Shell Oil is working on an integrated management information system covering petroleum products from the point of sale through the plant level, that involves financial consolidation of all figures by Shell's data-processing center in New York.

A Western Union spokesman conceives of "display devices" mounted in "management decision-making rooms." The "score," or integration of all data within a business, would be projected in a single curve on a cathode ray tube.

Ewell doesn't think that data processing will ever be carried that far. But he sees plenty of room for growth and utilization of the technique. To achieve this end P&G has evolved a three-phase approach: (1) study of data-processing applications by an unbiased staff, reporting to top management ("Involvement of line organization in the very early steps may warp the study, if not completely scuttle it," warns Ewell; (2) development and installation, headed by a staff project leader, aided by the operating departments involved; (3) operation of the debugged system.

No Centralization: While the corporate data center, operated by the Data Processing Systems Dept. has, and always will have, the most up-to-date and highest-capacity "hardware" in the company, according to Ewell, P&G visualizes other data centers at distant locations. They will all be

P&G's Swanson (left) and Ewell want more-sophisticated computers.



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linked with each other and with the corporate data center by wire, and will be operated by the Data Processing Systems Dept. Says Ewell, "We feel this is correct because the systems upon which the hardware (computers, etc.) operates will touch all departments."

Ewell and Swanson expect to continue advancing the capacity and sophistication of data-processing equipment whenever a reasonable payout can be anticipated. By mid-'62 P&G will complete installation of "the next generation" of large-scale computers to keep pace with its data-processing requirements, would like to see development of computers that handle both commercial and scientific jobs easily and effectively.

In any event P&G doesn't intend to let its corporate approach to data processing inhibit the thinking and working of individual departments with respect to data handling. For example, P&G's Advertising Dept. will retain control of equipment used in handling millions of coupons used in the promotion of P&G products. This department pioneered a technique that allows P&G customers to use less expensive punch-card equipment, while P&G will use small solid-state computers to cope with the much-larger volume at its end.

P&G's approach is not a patent-medicine cure for data-processing problems. But it does hold out comfort to all companies seeking ways to make computers pay off.

Confidence Poll

Corporations have the capital for expansion but lack the confidence that their risks will be rewarded, according to a new survey of business leaders (including some from the chemical process industries) on President Kennedy's economic policies.

The survey, conducted by Opinion Research Corp. (Princeton, N.J.), puts lower corporate income tax rates and liberalized depreciation allowances high on the list of business executives' desires. Administration tax proposals to date are viewed as inadequate to achieve necessary industrial growth. In addition there is a strong feeling that foreign countries' more favorable tax treatment and more liberal depreciation policies offer more attrac-

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tive opportunities to capital.

What steps by the federal government do the executives feel would be most helpful in stimulating the growth of business generally? Answers from 150 executives: reduce taxes, say 45%; encourage a healthy business climate (leave business alone), 29%; improve depreciation allowance (faster write-off), 19%; control government spending (balance the budget), 19%; crack down on labor monopoly (cut the featherbedding), 13%; maintain sound money and fiscal policies, 12%; encourage accrual and use of private capital, 9%; allow more equitable handling of expenses and dividends, 7%; eliminate government competition with private enterprise, 7%; lessen impact of foreign competition (revise tariffs), 5%; spend more on housing, roads, defense, public works, 4%; clarify rules and policies on mergers, 3%.

Air-Pollution Review

Dayton, O., will not take legal action to gain compliance from foundries on air-pollution control. Instead city commissioners will review the degree of voluntary cooperation by the foundries at the end of three months.

City Manager Herbert W. Starlick said that "so long as there is an indication or seeming desire to cooperate" the policy of withholding legal action would be continued.

LEGAL

Weed-Killer Suit: A patent infringement suit between Diamond Alkali and Reasor-Hill Corp. (Jacksonville, Fla.) over the manufacture of a weed killer (clay pellets impregnated with 2,4-D) has been settled in federal district court at Little Rock, Ark. Diamond Alkali claims the exclusive right to the product and charges Reasor-Hill with infringing by manufacture of Weed Rhap-20. Both sides agreed to the judgment by Judge J. Smith Henley that Diamond Alkali holds the exclusive patent rights. Diamond has granted Reasor-Hill a sublicense so it may continue to manufacture the rival product. Diamond obtained original rights to the weed killer in '57 from Maurice M. Wright of Auckland, New Zealand.

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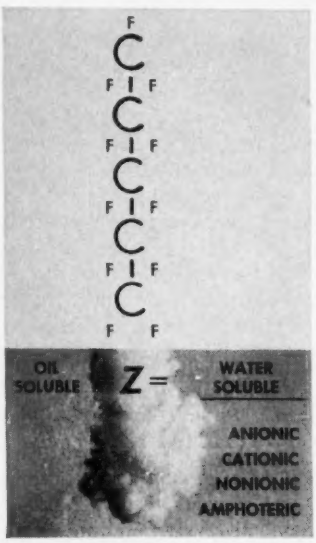

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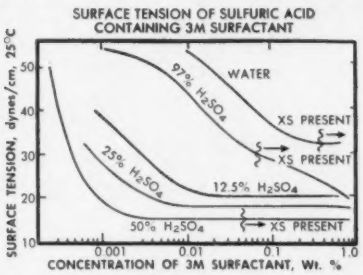
Surface Activity. The extremely low surface energy of the fluorocarbon chain of a 3M Surfactant allows attainment of **surface tensions** of less than 18 dynes/cm. . . . at least 10 dynes per cm. lower surface tension than any other surfactant.



And the unprecedentedly low concentrations avoid many of the bad side-effects that arise when working with conventional surfactants. (See diagram above.) (H_2SO_4)

3M Surfactants reduce **interfacial tensions** easily . . . even between acids and organic liquids that defy conventional surfactants. In actual test, the interfacial tension between 1 molar Sulfuric Acid and Decane has been lowered from 48 to 12 dynes per cm. by the addition of only 0.02% by weight of 3M Surfactant to the acid phase.

Excellent **leveling action** without moisture sensitivity is possible in paints, waxes, coating materials of many types, because 3M Surfactants reduce surface tensions at very low concentrations. In the matter of **foaming power** they offer a distinct advantage by being able to form stable foams in liquids such as strong acids, bases, oxidizing and reducing agents which destroy conventional organic surfactants. They effectively produce stable **emulsions** of small particle size.

Concentration Requirements. 3M Surfactants function at much lower concentration than conventional surfactants. Therefore, .001% by weight of a 3M Surfactant will reduce the surface tension of water to 30 dynes per cm. It would take .1% by weight of a typical Alkyl Benzene Sulfonate to do the same job!

CHEMICAL DIVISION

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LABOR

Settlements: About 1,000 hourly mill employees at Scott Paper Co.'s Winslow and Madison, Me., plants will receive a 7¢/hour wage increase, retroactive to June 1, as the result of a new contract, which also provides four weeks' vacation for 23 years, or more, of service. George F. Bessing, general manager of the Northeast division of Scott Paper, was chairman of the company's negotiating team. Kenneth Ranage, international representative of the United Papermakers and Paperworkers, headed the union group.

• More than 2,600 employees of Du Pont's Martinsville, Va., nylon plant have been granted pay increases. Hourly and clerical employees will receive a 5-8¢/hour pay hike retroactive to Sept. 1. W. D. Hartford, plant manager, said the raise resulted from recent negotiations between management and the Employees Council, a union.

KEY CHANGES

John T. McLoughlin to president and general manager, **Ernest P. Zobian** to executive vice-president, Vick Chemical Co. (New York), division of Richardson-Merrell, Inc.

Peter S. Barno to vice-president of employee and public relations, Worthington Corp. (Harrison, N.J.).

John G. Norris to assistant to the president, Fansteel Metallurgical Corp. (North Chicago, Ill.).

W. H. Barlow to vice-president, Ohio Oil Co. (Findlay, O.).

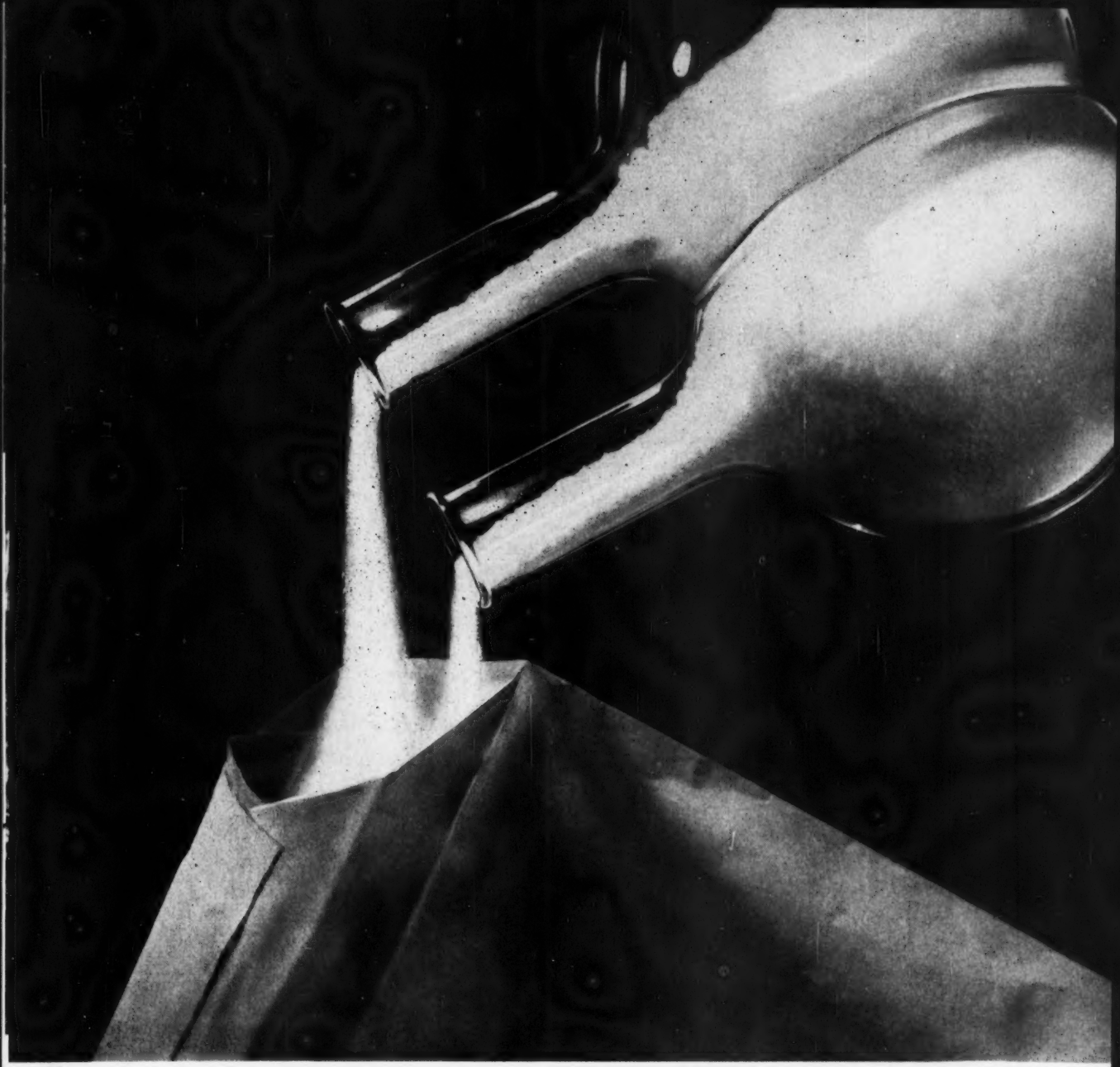
Douglas R. Nichols, Jr., to executive vice-president, Nichols Engineering & Research Corp. (New York).

Will Mitchell, Jr., to director of research division, Allis-Chalmers Mfg. Co. (Milwaukee).

Bradford S. Ritchie to vice-president and technical director, Sawyer-Tower, Inc. (Watertown, Mass.), protective and safety clothing manufacturer.

James C. Richards to vice-president of marketing, industrial products, B. F. Goodrich Co. (Akron, O.).

Floyd B. Odlum to chairman of the board of directors and senior officer,



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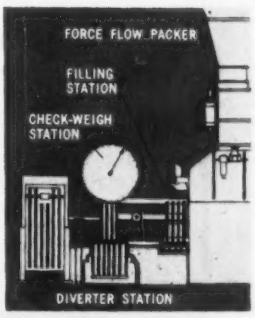

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ADMINISTRATION

Nels W. Stalheim to president and chief executive officer, Federal Resources Corp. (Los Angeles).

Claude E. Harper, William P. Jackson to vice-presidents, Permanente Cement Co. (Oakland, Calif.).

Robert A. Lineberger to controller, Beckman Instruments, Inc. (Fullerton, Calif.).

Harlan W. Northup to president, Technical Aid Service, Inc. (Columbus, O.).

Donald S. Walker to the board of directors, Hamilton-Thomas Corp. (Philadelphia), The Griscom-Russell Co. (Massillon, O.) and C. H. Wheeler Manufacturing Co. (Philadelphia).

Joseph E. Clermont to controller, Hills-McCanna Co. (Carpentersville, Ill.), manufacturer of valves, pumps and lubricators.

William D. Morrison to general manager, international division, Hooker Chemical Corp. (New York).

Robert O. Goodykoontz to vice-president, Esso Standard, Eastern Region (New York), division of Humble Oil & Refining Co.

Elbert G. Bellows to assistant to the presidents, De Laval Separator Co. (Poughkeepsie, N.Y.) and De Laval Steam Turbine Co. (Trenton, N.J.).

R. W. Ostermayer, Jr., to executive vice-president, Pennsylvania Industrial Chemical Corp. (Clairton, Pa.).

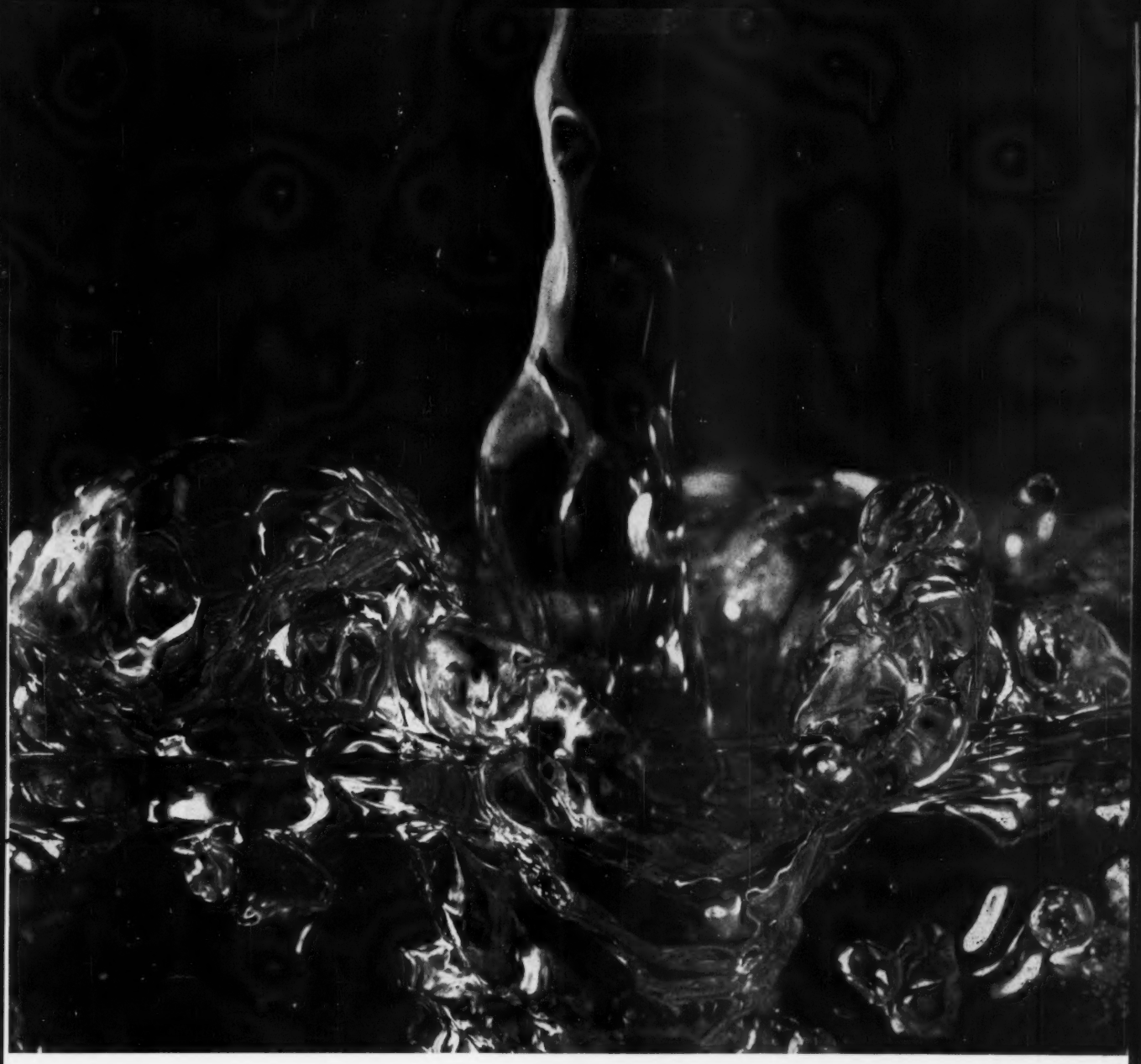
Nathan W. Snyder to vice-president and director of research and engineering, Royal Research Corp. (Hayward, Calif.).

John T. Watkins, Jr., to vice-president and general manager, West Coast operations, Fabricon Products (Los Angeles), laminated plastics manufacturer.

Ernest G. Swigert to chairman of the board, **Philip S. Hill** to president, **Harvey N. Black** to senior vice-president, Hyster Co. (Portland, Ore.).

John D. Craig, Jr., to vice-president of sales, Capco Minerals and Equipment Division (Trenton, N.J.), Custom Abrasive Products Co., Inc.

Eric S. Loeb to vice-president, Jerdan Chemical Corp. (New York).



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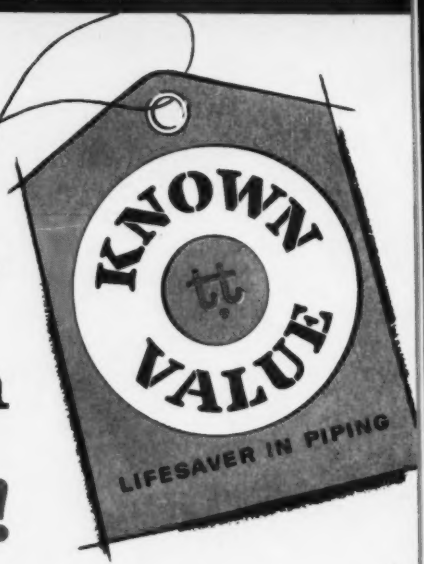

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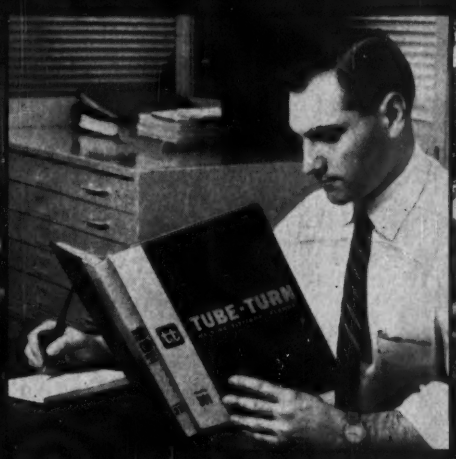

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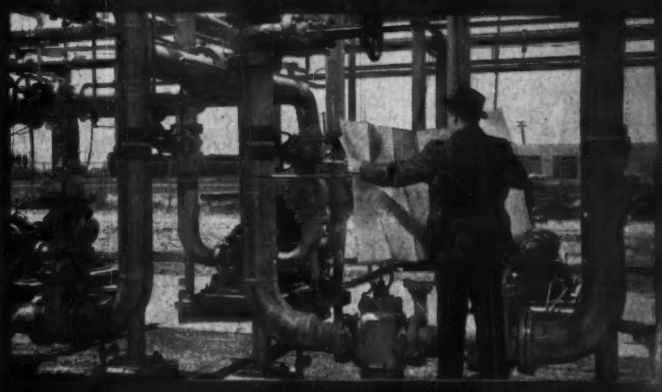

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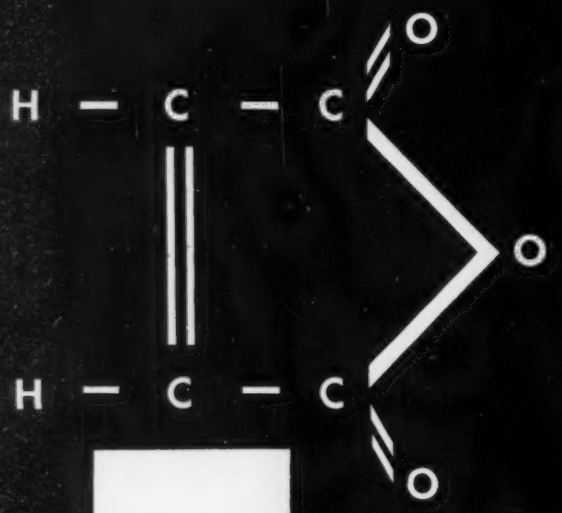

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Newsletter

CHEMICAL WEEK
September 23, 1961

The hazardous-substances labeling deadline may be extended. This would not affect labeling requirements for highly toxic substances and flammable liquids, already put in force by the Food & Drug Administration. But it would involve other new labeling requirements, effective date for which, under present law, is next Feb. 1.

For a variety of reasons, FDA did not publish final regulations until Aug. 12—about 13 months after the law was passed. This left industry only five months in which to comply with the regulations. The Manufacturing Chemists' Assn. protested to the Senate Commerce Committee and the House Health and Safety Subcommittee that five months is inadequate, particularly since the regulations are more stringent than industry had anticipated.

MCA requested an extension of 12-14 months. Sen. Warren Magnuson (D., Wash.), chairman of the Senate committee, says he is aware of the situation but doesn't see the point of introducing an extension bill this late in the session of Congress. But he asked MCA to submit a full report on the situation in the first week in January. He said: "If the industry is in real trouble, there would still be time to act before the deadline, and in that event you may be assured I will take action." Rep. Kenneth Roberts (D., Ala.), chairman of the House subcommittee, made a similar reply.

•

Some relief for beryllium metals producers is in sight. The U.S. Dept. of Agriculture has offered to buy some for the national stockpile. The amount to be stocked is secret, but officials describe it as "a fair amount, but nothing spectacular."

There is one stipulation, however. The beryllium metal "must be processed in the U.S. from raw materials produced in friendly foreign countries"—mostly Brazil, India and sections of Africa and Asia.

•

Employment in the chemical process industries rose slightly in August, according to the Labor Dept. In chemicals and allied products, August employment totaled 887,300—an increase of 2,200 over July and 5,100 over Aug. '60. Average weekly earnings of workers in this category rose to $109.15 in August, compared with $108.73 in July and $104.90 in Aug. '60. This generally reflects a steady increase in average hourly earnings—from $2.54 in Aug. '60 to $2.62 in July and $2.63 in August. Average weekly hours worked in the industry have remained fairly stable in the past year.

•

Support for Sen. Kefauver's broad drug regulation bill comes from Health, Education & Welfare Secretary Abraham Ribicoff. Testifying before Kefauver's Antitrust and Monopoly Subcommittee last week,

Washington Newsletter

(Continued)

Ribicoff strongly backed the provision that would permit the Food & Drug Administration to test the efficacy of a new drug as well as its safety. He also would like to let FDA certify antibiotics and give HEW authority to standardize drug names and strengthen its factory inspection procedures. Lee Loevinger, Justice Dept. antitrust chief, suggested a requirement that drugs be advertised by generic rather than tradenames to prevent confusion.

Ribicoff did oppose a provision that would give HEW authority to license drug manufacturers. And he said he had no view on proposed changes in drug patent laws. (*See Viewpoint, p. 5*). Since the subcommittee plans periodic further hearings through this fall, no Congressional action is contemplated for this session.

•

Is power generation at Hanford, Wash., a dead issue? Best bet late last week was that the Senate would recede from its position and accept as final the decision of the House that no generators should be installed at the huge nuclear reactor. This generally was a public vs. private power fight, with Rep. James Van Zandt (R., Pa.) leading the successful battle on behalf of the private utilities. Under his prodding, the House voted twice to reject installation of the generators. Proponents feel that further efforts this year would be a waste of time and energy.

•

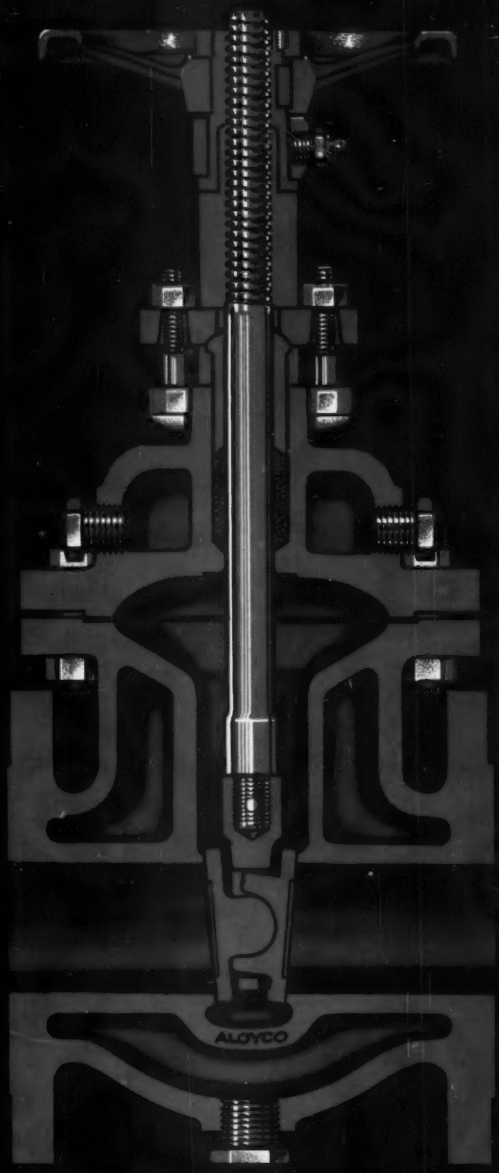
Justice Dept. opposition to the Du Pont easement bill may prove the measure's undoing. What the department actually told the Senate Finance Committee last week was that it does not recommend passage of the bill to ease the tax burden on Du Pont stockholders through forced divestiture of General Motors stock (*CW, Sept. 16, p. 48*). Senate opponents of the measure seized on the statement to bolster their efforts to defeat the bill.

The situation now: There is a fairly good chance that the House will pass the bill this year. But Senate liberals will try to delay it until next year—if they can't defeat it during the current session. Final enactment before adjournment is extremely doubtful.

•

A proposed Congressional crackdown on railroad rate cutting is dead for this year. The Senate Commerce Committee, by a narrow (9-8) margin, has confirmed an earlier decision to postpone action on new freight rate legislation until '62.

The trucking and barge industries, aided by the Teamsters Union, want Congress to rewrite the ground rules used by the Interstate Commerce Commission to determine the fairness and legality of rate reductions. Under the '58 Transportation Act, ICC is forbidden to hold the rates of one mode of transportation to a particular level to protect another. The rail lines, the National Industrial Traffic League and other shipping groups oppose any change.



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SR61-3

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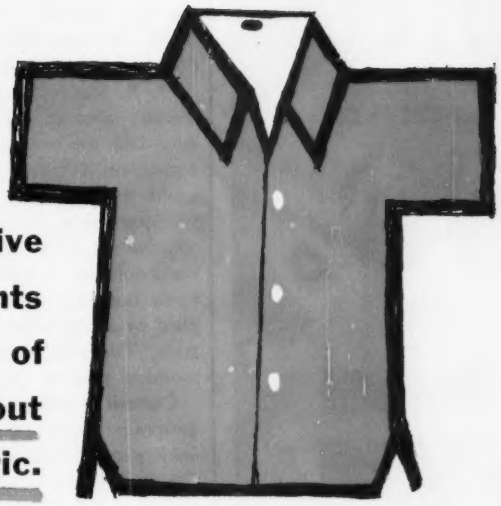

Ironing Out Wash-and-Wear Wrinkles

For a field that has been commercial for six years, the development of wash-and-wear finishes for natural fibers is surprisingly far from complete — and an undetermined number of years of research lie ahead. That's the gist of a paper presented at the recent national meeting of the American Chemical Society by Francis Burr of Fabric Research Laboratories, Inc. (Dedham, Mass.).

Supporting evidence for Burr's point is found in the introduction of new commercial products and continuing reports of research activity in the field. American Cyanamid, for instance, will soon introduce two new finishing mixtures called simply Chemical Reactants. And Union Carbide Chemicals Co. has just come out with a new high-purity glyoxal, a creaseproofing-agent intermediate. New products in the past few months have come from Monsanto (Retane) and General Aniline & Film (Ganalok —*CW Technology Newsletter, March 18*); both are thought to be offering sulfone derivatives.

New finishing processes based on formaldehyde are also getting attention, and the U.S. Dept. of Agriculture's Southern Regional Laboratory (New Orleans) is still devoting a great deal of effort to developing improved cotton finishes.

Wool technologists are also interested in research on wash-and-wear finishes (for use in light dresses, for instance). Most recent development: establishment of the Wool Bureau's (New York) experimental wool finishing laboratory at the Lowell, Mass., Technological Institute.

Goal of all this activity is the development of economical finishes that give natural fabrics high crease resistance in both the wet and dry states and yet do not produce undesirable side effects such as discoloration, odor or weakening of the fabric. Every finish developed to date has at least one of these drawbacks or is too costly.

That the stakes are high is borne out by the National Cotton Council of America's estimate that cotton already holds 63% of the nation's wash-and-wear market, in spite of the insurgence of the naturally crease-resistant synthetics. In '60 nearly 2 billion yds. of cotton wash-and-wear fabrics were produced, and Burr estimates that 30 million lbs. of wash-and-wear finishes were used. He sees a potential market of 60 million lbs. for these chemicals, plus additional markets for catalysts, softeners and firming agents.

Cross-Linkers: Greatest current research effort is on simple chemicals that can cross-link cellulose polymer chains (e.g., formaldehyde, divinyl sulfones). However, Burr points out, the older wash-and-wear finishes that have been called resins (e.g., urea-formaldehyde, melamine-formaldehyde products) are also cross-linkers. These materials are often called resins because they are normally used in applications where they polymerize.

The nature of their reactivity in creaseproofing cotton was not well understood, and they were assumed to polymerize in the cotton fibers. However, recent evidence indicates that, because of the quantities and manner in which they are utilized, these materials are more likely to react with the cellulose molecule than to polymerize. Thus there is actually little difference in mechanism between the "resins" and the newer "reactive" finishes.

Chief advantage of a successful formaldehyde finish would obviously be its low cost. Formaldehyde, probably the first creaseproofing agent (tested many years ago), has the major drawbacks of volatility and fabric weakening. Its low cost, however, has encouraged continuing work, and two commercial processes — Courtaulds' Prestwick and Joseph Bancroft & Sons' Bancare—are said to be based on formaldehyde.

But most of the researchers' success with formaldehyde so far has been in

creaseproofing rayon rather than cotton.

Within the past year the sulfones have been receiving special attention. At the National Cotton Council's ninth Chemical Finishing Conference ('60), Giuliana Tesoro and coworkers of J. P. Stevens & Co.'s central research laboratories (Garfield, N.J.) described the use of divinyl sulfone derivatives as cotton cross-linkers that avoid the drawbacks of divinyl sulfone itself (e.g., toxicity, instability in alkaline solution). The derivatives are water-soluble, nonvolatile and relatively nontoxic, and they can be applied by a conventional padding operation. The new Monsanto and GAF products may be of this family.

Current Workhorses: Right now the compounds most used in cotton cross-linking are dimethylolethylene urea (DMEU) and various melamines and triazones. DMEU has been the most important single compound in the field. Fabrics made with it have a soft hand (because no insoluble surface resins are produced in the finishing process as there are when excess amounts of the thermosetting resins are used) and have good initial resistance to chlorine (which could discolor or degrade the fabric). However, they are subject to acid hydrolysis, and chlorine resistance drops after repeated commercial washings.

The melamine products have good washfastness, but exhibit varying chlorine resistance. Combinations with DMEU have been effective. The older urea-formaldehyde finishes lack chlorine resistance and are therefore limited to use on colored fabrics. In addition, they are relatively easily hydrolized. This reduces the fabric's crease resistance and produces an unpleasant formaldehyde odor. The urea finishes, though still used in volume, are generally restricted to use on inexpensive goods only.

The triazones, which have been commercial for several years, have good chlorine resistance, even when used in combination with chlorine-susceptible finishes, and are thus preferred for use on white fabrics. They also have good hydrolysis resistance, but must be applied in a carefully controlled manner to avoid odor formation or discoloration at high temperatures.

Epoxides have also been used as cotton cross-linkers (since '56, when Shell Chemical's Eponite 100 was introduced). Although they give finishes that are odorless, chlorine resistant and durable, epoxides are costly and require a strong acid catalyst (zinc fluoborate). They can be applied in combination with DMEU and other nitrogen-containing finishes, but cost is still high.

Another effective, but relatively costly, approach is the use of epichlorohydrin, basis of Deering Milliken's Belfast process introduced last year. Used principally in giving wet-crease resistance, the epichlorohydrin has to be combined with conventional finishes to impart crease resistance in the dry state as well.

USDA Research: Backing up industrial efforts at improving wash-and-wear cotton is a mountain of work at USDA's New Orleans laboratories. A recent achievement is development of a formaldehyde finishing process that gives cotton both dry- and wet-crease resistance. A previously developed method, suitable only for wet-crease resistance and called the Form-W process, involves reacting the wet, swollen fabric in a water solution of formaldehyde and hydrochloric acid. In the new process, called Form-D, the fabric is only partly swollen and is reacted in a solution of acetic acid, water, hydrochloric acid and formaldehyde.

USDA is also looking at possible new finishes, such as tris(1-aziridinyl) phosphine oxide (APO). This compound gives good crease resistance and high laundering stability, but tends to yellow when white garments are ironed after chlorine bleaching. Nevertheless, several firms are said to be considering commercial production of APO.

Diaziridinyl compounds have been studied at Battelle Memorial Institute (Columbus, O.) under USDA sponsorship. Although showing good effectiveness, Battelle reports, they are highly susceptible to chlorine, and further development of curing techniques is needed.

Work on changing variables other than the finishing compound often improves wash-and-wear too. USDA studies along this line include changes in catalysts, softening agents, mercerization procedure, amount of fiber swelling and type of fabric weave. The present commercial use of polyethylene as a softening agent, for in-

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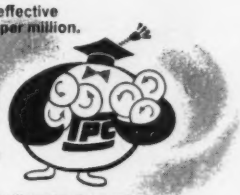

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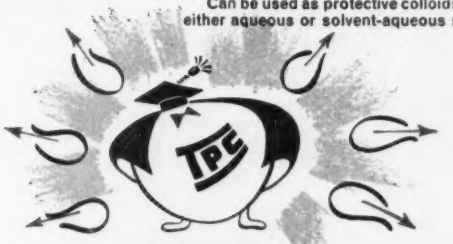

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stance, was proposed by USDA when it found that acrylics and silicones formerly used tended to pick up soil during laundering.

Textile Research Institute (Princeton, N.J.) is also active in this type of wash-and-wear research.

Wool, Too: Wool producers are keenly interested in finding wash-and-wear finishes for their products, although the total volume of woolen goods is far smaller than that of cotton, and the wash-and-wear possibilities are less extensive with wool. Nevertheless, the Wool Bureau will soon offer the use of its new experimental finishing plant to industry. It will be made available for trial work with mills under the supervision of the bureau's scientists on a free-of-charge basis.

All types of finishing processes will be tested at the facility, including wash-and-wear. However, shrink-proofing still commands primary attention.

In addition, the bureau is sponsoring two related investigations: Harris Research Laboratories (Washington) is studying the influence of yarn and fabric construction on the launderability of wool, and Fabric Research Laboratories is studying the yarn and fabric relationship with wrinkle resistance of lightweight all-wool fabrics.

With greater competitive pressure expected from the synthetics and from such innovations as coin-operated dry-cleaning, researchers have extra incentives to spur work on wash-and-wear finishes for natural fabrics.

PRODUCTS

Membranes: Radiation Applications Inc. (Long Island City, N.Y.) has developed a new line of ion-exchange and permselective membranes under the name Permion. They are specially treated, natural or synthetic polymers in film or mat form. They can be tailor-made for customers and are expected to find application as battery separators and in dialysis, filtration, other separation processes.

•

Creatine: The development of a new method of producing Creatine in quantity, which is claimed to lower its price to a fraction of the present cost, has been revealed by Pfanstiehl Laboratories, Inc. (Waukegan, Ill.). The chemical and its derivative, Cre-


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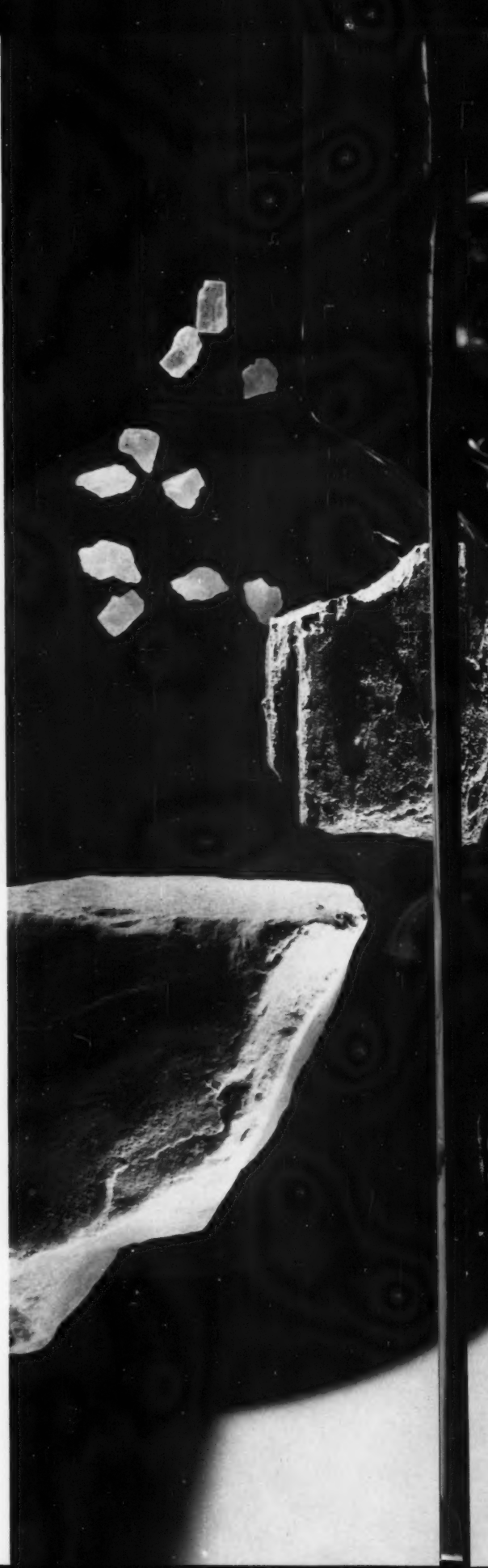

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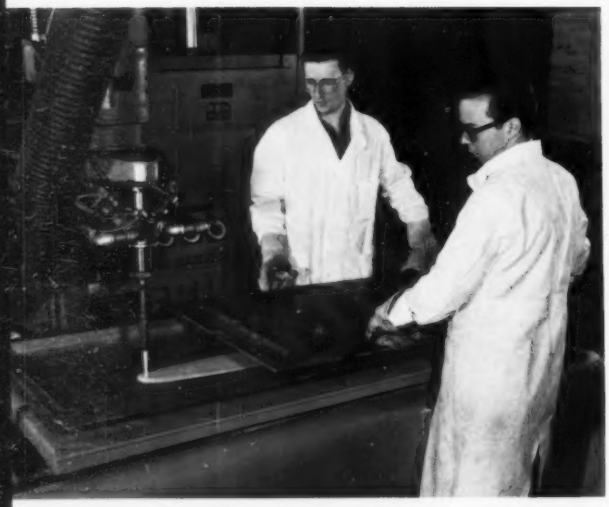

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atinine, are used as catalysts in the polymerization of butadiene, as fat antioxidants and as inhibitors of copper and brass decoloration.

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Benzoyl Formic Acid: S. B. Penick & Co. (New York) is making available developmental quantities of benzoyl formic acid (phenyl glyoxylic acid) and methylbenzoyl formate for use as intermediates in pharmaceutical, veterinary and agricultural chemicals.

•

Hydrogen Source: Metal Hydrides Inc. (Beverly, Mass.) has introduced a new lightweight source of hydrogen for industrial and laboratory applications. The compound, called Hydripills, is a tableted mixture of sodium borohydride and cobalt chloride, which will react catalytically with water to produce hydrogen. The product is available in laboratory and development quantities, could replace the Kipp generator.

Surfeit of Money

While industrial firms are always hard pressed to find enough money for research, some private foundations—major contributors to research organizations—are having trouble giving it away. Reason: the U.S. government has stepped up its program of allocations for scientific research, and government money is saturating many research laboratories.

Alfred P. Sloan Foundation (New York), even though it is still expanding its donations to scientific and technological research and development projects, is one of the philanthropic organizations complaining about encroaching government supports.

Alfred P. Sloan, Jr., president of the foundation, points out reason for concern. Although the government's expanding public assistance is understandable in light of the international situation, he says, it creates both short-run and long-run problems for private foundations.

The short-run problem is to see what, if any, adjustments must be made in existing foundation programs. But the long-run problem, Sloan says, is "nothing less than that of the future place of private, voluntary support . . . in the comprehensive national system." Unless the volume of

voluntary support can be augmented and brought within reasonable equilibrium with government support, he adds, the possibility of altering the place of the private philanthropy must be faced.

Basically, the question is whether part of scientific research should be financed through the government—i.e., exclusively through taxes—or through the traditional mixed, public-private system. The answer will be seen in the public's reaction to the expanding government assistance.

Among other projects, the Sloan Foundation supports a program for basic research in the physical sciences. In the year '55-'56 its expenditure for this program amounted to $196,000. This year the figure is up to nearly $1 million.

Similar increases in allocations for scientific work are shown at other foundations—e.g., The Rockefeller Institute (New York) and The Camille and Henry Dreyfus Foundation (New York). The latter organization made its single largest grant—$2.5 million—two years ago for the establishment of an international center for polymer chemistry research. The center is now part of the Research Triangle Institute in North Carolina.

EXPANSION

• Brookhaven National Laboratory (Upton, N.Y.) will build what it claims is the world's first high-intensity-radiation development laboratory. The laboratory, designed to help study the effects of nuclear radiation, is scheduled to be completed by July '62. At first, radiation will come from 500,000 curies of cobalt-60, but plans call for the radiation level to be doubled.

• The Argonne National Laboratory (Argone, Ill.) is adding a $4.4-million extension. Called the Chemistry Hot Laboratory, the addition will be a center for isolating and studying highly radioactive man-made elements. The entire facility is operated by the University of Chicago under contract to the Atomic Energy Commission.

• Kennecott Copper Corp. (New York) has purchased a site in Lexington, Mass., for its new Basic Research Laboratory. A research program emphasizing solid-state physics of metals will be conducted, initially by approximately 50 scientists.

NEW SLANTS ON HEAT PROCESSING FROM SELAS

what ethylene producers are doing about increasing capacity

The domestic demand for ethylene, largest-volume olefinic raw material produced by the petrochemical industry, continues to grow at a substantial rate. Over a four-year period (1955-'59), production capacity for ethylene skyrocketed from a little over three billion to a 5.6 billion pounds per year. And the plateau for this fast growth rate is nowhere in sight. Conservative estimates indicate that by 1965, ethylene capacity in the U.S. will have reached a rewarding 7.1 billion lbs./year.

Giving life to this tremendous growth in production capacity is the cracking furnace. In many petrochemical plants throughout the United States, the cracking furnaces were designed and built by Selas.

The record shows that Selas supplied 47.5% of the total ethylene production capacity, from all sources, in the 1955-'59 period. This represented 79% of the furnaces designed and constructed by firms other than the petrochemical companies' own engineering staffs. The 31 Selas GRADIATION® furnaces installed from '55 to '59 corresponded to a total ethylene cracking capacity of 1.2 billion pounds. In 1960, Selas sold or installed cracking furnaces representing additional ethylene production capacity of 0.96 billion pounds or 80% as much capacity as Selas sold and installed in the previous four years.

The acceptance of GRADIATION furnaces for ethylene production is exemplified by repeat orders. In the past eight years, one leading ethylene producer has —on nine different occasions—purchased a total of 17 Selas GRADIATION cracking furnaces. Two other petrochemical plants have each installed 11 furnaces. Each made four separate purchases to reach their present production capacity.

As the human heart adjusts to the varying demands of the body, so are Selas GRADIATION furnaces adjusted to changes in ethylene production dictated by competitive pressures. The Selas furnace, for example, permits cracking of ethane, propane, butane or naphthas by simple, easily-made adjustments in the patented radiant heating pattern. This flexibility—combined with the uniformity of heating and controllability of Selas furnaces—allows ethylene producers to obtain optimum yields from varying feed stocks, and to balance their production economically against changing marketing situations.

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Technology
Newsletter

CHEMICAL WEEK
September 23, 1961

Ultrahigh-purity, single crystals of tungsten have been grown by Westinghouse Electric's Lamp Division (Bloomfield, N. J.). The crystals are ductile even at temperatures as low as −330 F, and as Westinghouse sees it the development may open new areas of commercial fabrication. To get the single crystals, Westinghouse forms an ingot using powder metallurgical techniques, then zone-refines it with an electron beam.

Linde last year revealed it was growing single crystals of tungsten (as well as other metals) using its flame-fusion process. Westinghouse, however, is emphasizing purity of its material—up to 99.9975%.

•

Progress on automotive devices to cut smog. The California Motor Vehicle Pollution Control Board is taking two steps it hopes will "go a long way toward solving the problem." It will probably approve criteria for exhaust-control devices, including the one that calls for effective operation during the first 12,000 miles. And it is giving formal approval to the first crankcase emission-control device. This means that the voluntary program for installation can be stepped up for all new cars.

At the same time, the board is reviewing eight applications for exhaust controls, four for crankcase devices.

•

A new line of fluorosilicone fluids and greases is being marketed by Dow Corning (Midland, Mich.) this week, supplementing the firm's fluorosilicone rubber, Silastic LS. The new compounds are made by substituting fluoroalkyl groups for some of the methyl radicals attached to the siloxane backbone of most silicones. The result, says Dow Corning, is a product that retains characteristic silicone properties but that has exceptional resistance to chemicals. The new compounds will sell in the $25-45/lb. price range. But the company expects the price curve will resemble that of Silastic LS, which was introduced at $30/lb. (in '56), now sells for $12/lb.

•

Stress cracking of metals can be reduced by application of dodecyl alcohol to the surface, according to the National Bureau of Standards. The bureau evaluated the effect of the alcohol on the rate of fatigue crack propagation in steel, stainless steel, aluminum, and a copper-beryllium alloy. Findings: application of the alcohol increased the number of cycles required to propagate cracks by a factor ranging from 1.4 for stainless steel to 5 in the copper-beryllium alloy.

•

A new ultrasonic mass flowmeter is under development by Dynasonics Corp. (Syosset, N.Y.). If successful, it will be used to measure water coolant flow in General Electric's Knolls Atomic Power Laboratory. The

idea is to send ultrasonic impulses upstream and downstream, measuring their time differences. It has been tried before, poses some problems. One firm had to give up on the project because the velocity of sound is a function of the temperature of the stream and it could not satisfactorily compensate for this.

The other type of ultrasonic mass flowmeter (made by Gulton Industries) sends impulses across the stream, then measures the deflection. In this technique temperature compensation by a thermistor is relatively straightforward.

•

A new, two-component, epoxy industrial adhesive system has been brought out by Rubber & Asbestos Corp. (Bloomfield, N. J.). The two components are mixed in a 1:1 ratio by volume; a cherry-red component and a clear amber one are mixed until a uniform tint is achieved. The 1:1 ratio eliminates the need for weighing or proportioning equipment (makes it "idiotproof," says the firm). The system sells for $8/gal.—a lower cost per square foot of glue than is obtainable with neoprene, says the firm.

•

Metal Hydrides and Germany's Bayer have signed an agreement to exchange use-information regarding alkali metal borohydrides. MHI says that the cooperation, subject to existing commitments, will involve patents and licensing, will include manufacturing know-how under certain conditions. The agreement comes shortly after an arrangement MHI made with Swedish MODO for developing sodium borohydride in bleaching (*CW Technology Newsletter, Sept. 16*).

•

A new therapeutic dentifrice—to treat hypersensitive teeth—is being introduced by Block Drug Co. (Jersey City). It's called Sensodyne, contains 10% strontium chloride. Dental hypersensitivity—painful reaction to cold (or heat, sweets or acid)—afflicts almost every adult at one time or another. To ease the pain, dentists have traditionally employed a variety of chemical treatments in their offices; the only home treatment is a battery-operated toothbrush that drives fluoride ions into the teeth.

In the early '50s Polish dentist Jadwiga Pawlowska found strontium chloride an effective weapon. Her findings have been confirmed by Abraham Cohen of the University of Pennsylvania's dental faculty and the late Milton Ross, dental clinical director of Monmouth Medical Center (Long Branch, N.J.).

Block Drug has formulated the compound into a flavored product that has foaming and polishing action—without use of calcium, magnesium, phosphorus and carbonates usually contained in toothpaste. The means by which the dentifrice works is not fully understood, but one theory is that it blocks impulses before they reach the nerve. Stimulation of recalcification is thought to contribute also.

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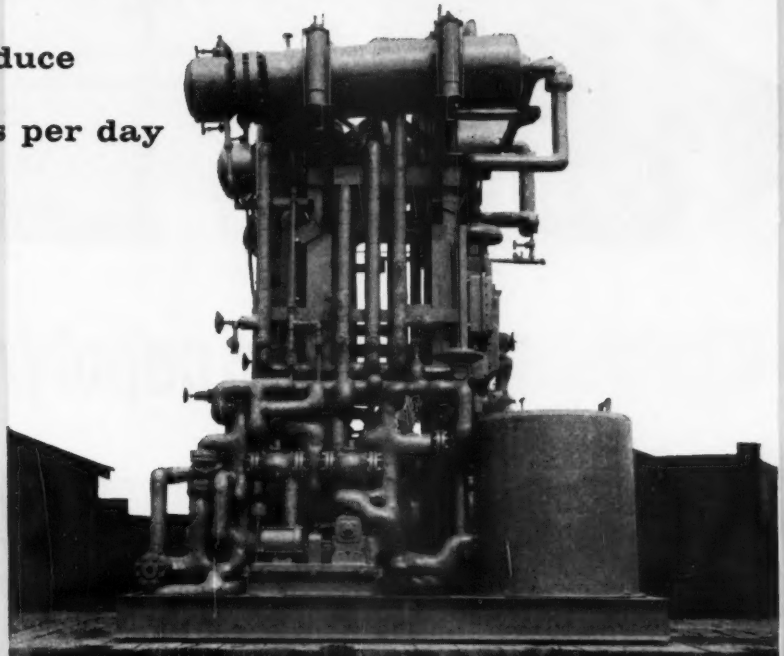

Solves the need for hydrogen sulfide gas in quantities not practical to handle by cylinders Girdler can now offer you low cost compact hydrogen sulfide package units with capacities from 1 to 5 tons per day. The small unit will produce up to 2000 pounds per day, and a larger unit produces from 2000 to 10,000 pounds per day. They will also operate efficiently and economically at a fraction of their rated capacities.

They utilize a simple new Girdler process based on the reaction of hydrogen with liquid sulfur at elevated temperature and pressure to produce hydrogen sulfide gas. The complete units are fabricated at Girdler's shop and are shipped partially assembled on skids with a minimum of work to be done at the plant site. Operating requirements include hydrogen, liquid sulfur, electric power, steam, and cooling water.

Write for full information on new Girdler Hydrogen Sulfide compact Units today. Take advantage of Girdler's know-how and proven experience in the field of high-temperature, high-pressure processing plants.

GIRDLER

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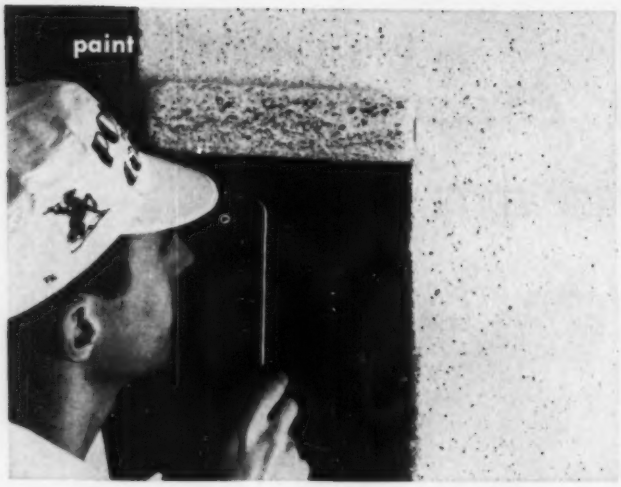
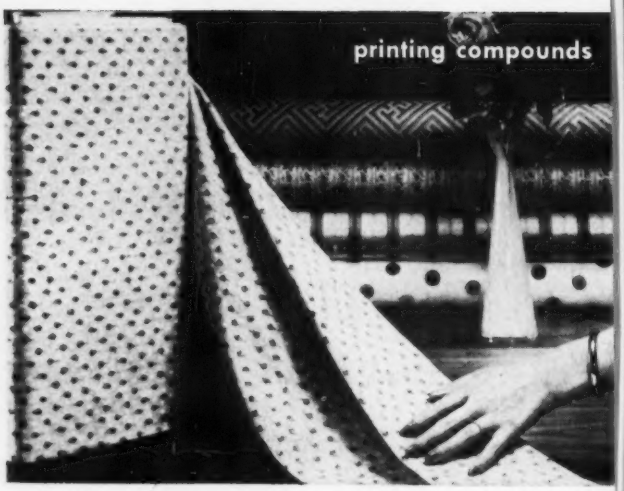
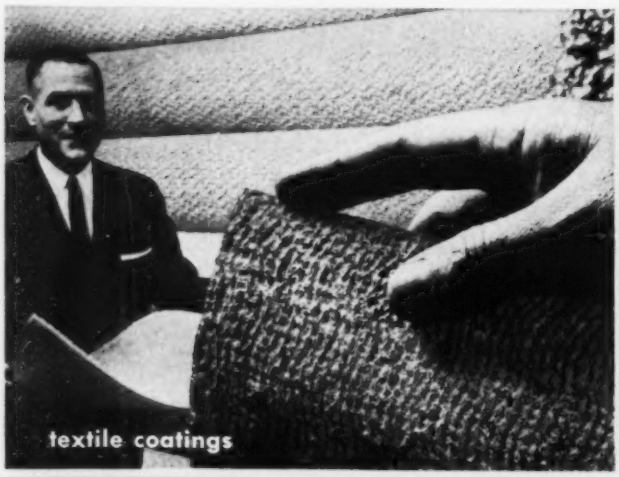
designers and constructors of plants for the production of: Hydrogen ▪ Carbon Monoxide ▪ Carbon Dioxide ▪ Ammonium Nitrate ▪ Hydrogen Sulfide ▪ Ammonia ▪ Synthesis Gases ▪ Hydrogen Cyanide ▪ Anhydrous Hydrogen Chloride ▪ Formaldehyde ▪ Girbotol Gas Purification ▪ Sulfur Recovery ▪ Urea.

SUBSIDIARY OF THE CHEMICAL & INDUSTRIAL CORP.





upgrade copolymer systems



THE LITHIUM REACTOR

CURRENT INFORMATION ON LITHIUM CHEMISTRY AND METALLURGY

LITHIUM HYPOCHLORITE— A SUPERIOR DRY BLEACH

LCA has just announced the development of lithium hypochlorite for use as a dry bleach. Equally adaptable for home, commercial or institutional laundries, it affords superior performance over other commercially available dry bleaches.

To date, the problem has been to secure a material that would offer the effectiveness of sodium hypochlorite solution bleaches combined with the greater convenience of a dry product. Although previously available dry bleaches have eliminated the troublesome features of the liquid product, they have possessed drawbacks of their own. These drawbacks were: weak action . . . poor solubility in some cases . . . need, in other cases, for calcium precipitation by soda ash before being used . . . at times expensive and complicated formulation.

The newly available lithium hypochlorite product, with approximately 35% available chlorine, combines for the first time the convenience of a dry bleach with the superior bleaching ability of sodium hypochlorite liquid bleaches. It may be characterized as follows:

Effectiveness—In bleaching performance, lithium hypochlorite is the equal of sodium hypochlorite liquid bleach and superior to the chlorinated cyanuric dry bleaches.

Convenience — Lithium hypochlorite is produced as a white granular material readily soluble in water.

Safety—Lithium hypochlorite has the same effect as sodium hypochlorite on the color of vat-dyed cotton fabrics and causes no greater decrease in fiber strength after repeated laundry cycles in which it is used as a bleach.

Formulation—A lithium hypochlorite bleach formulation does not require pH and odor control ingredients. There is no need for a spray-dried base bead. The formulation may be made by simple blending of the concentrated lithium hypochlorite with an inexpensive inert filler.

Stability—To insure adequate stability, lithium hypochlorite requires good protection from moisture and carbon dioxide. A comprehensive investigation, covering a variety of formulations, several types of containers, and varied storage conditions, has shown that the required protection is readily achieved.

Further information on the properties and application of lithium hypochlorite may be obtained by writing to Lithium Corporation of America.

LITHIUM FLUORIDE

Versatile Material for Industry

Lithium fluoride possesses a number of distinctive properties which are gaining it increasing utility in industry, particularly in ceramics and metallurgy.

Lithium fluoride combines the fluxing action of lithium and fluorine, and is therefore one of the most effective fluxes known. This property leads to many valuable applications in ceramics, particularly for porcelain enamels and special glass linings. When added to regular steel ground coats, it lowers and widens the firing range, and acts as an adherence-promoting agent, similar to nickel flash.

An important use in metallurgy is as a component of brazing and welding fluxes for nonferrous metals. Here it contributes low melting, liquid slags, and an acid reaction that cuts oxide coatings. Its nonhygroscopic nature is another desirable property in this application.

Lithium fluoride is used in salt-bath compositions which find application in the fields of nuclear energy, fuel cells, electrowinning, etc.

Scientific applications include the use of lithium fluoride crystals in ultraviolet and infrared optics.

There are a variety of other applications as well—some well established, others still in the development stage. Those interested in further information are invited to write to our New York office.

LITHIUM IN BRIEF

New developments involving lithium are constantly appearing in the literature. Each month some will be mentioned here briefly.

A recent study of solid-liquid phase equilibria for alkali carbonates covers the binary systems Li_2CO_3-Na_2CO_3 and Li_2CO_3-K_2CO_3, as well as the ternary system Li_2CO_3-Na_2CO_3-K_2CO_3. (6562)

Lithium fluoride and lithium carbonate were used as mineralizers in the formation of mullite from kaolin. (6420)

A recent paper describes a simple inexpensive radiation dosimeter which utilizes the thermoluminescence of lithium fluoride. (6000-A)

Lithium fluoride coatings on aluminum mirrors show a high reflectance of wave lengths as low as 1000A°. (6607)

A recent investigation showed that the reaction of lithium hydroxide and silica differs from that of sodium and potassium hydroxides. In mortar, the reaction of lithium hydroxide with opal is negligible compared to the other alkali hydroxides. This supports conclusions of earlier work by others that lithium compounds reduce and virtually inhibit mortar expansion. (6182)

Vinyllithium may be prepared directly from vinyl bromide and lithium metal containing 2% sodium. (6406)

A recent patent describes the preparation of various alkyllithium compounds by reacting lithium hydride with olefins in an inert medium at 50-300°C and high pressures. (6308)

The phase diagram of the ternary system LiF-CaF_2-BaF_2 was investigated. The eutectic and the other low-melting compositions are recommended as fluxes in welding nonferrous metals. (6010)

A recent dissertation covers a detailed study of lithium isotope effects on the physical and chemical properties of lithium alkyls. (6203)

Vinyllithium was found to initiate rapid polymerization of styrene in tetrahydrofuran. (6662)

A recent patent describes a catalyst for the polymerization of olefins, comprised of a mixture of a transition metal halide with lithium hydride or certain lithium alkyls and aryls. (6647)

LITHIUM CORPORATION OF AMERICA, INC.

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Hand labor for a modern plant: Native workers construct Union Carbide's polyethylene plant on Trombay Island.

INDIA

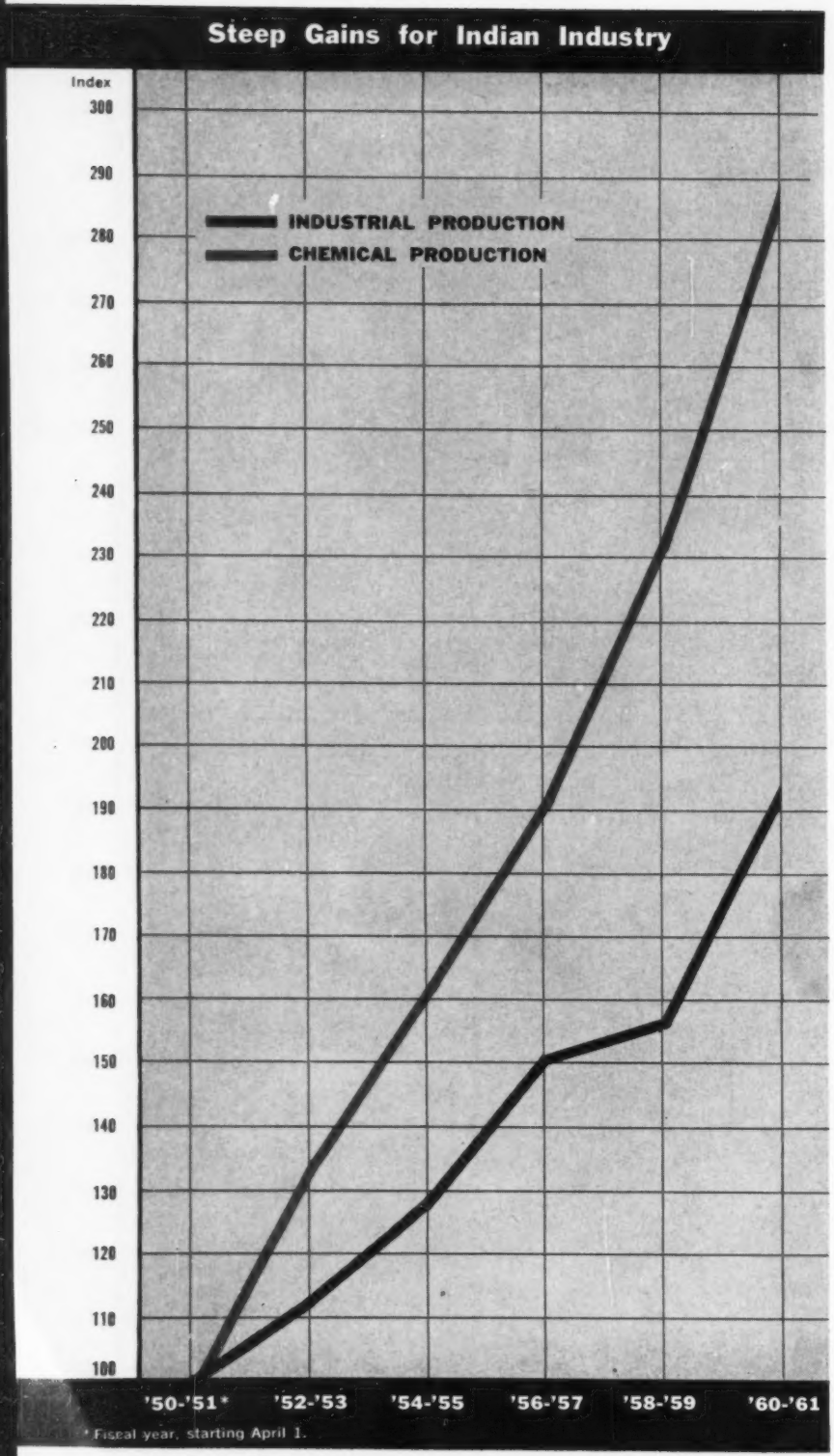
More U.S. companies are sharing in its fast-paced chemical growth.

On Oct. 5 India's government will open in New York City the first foreign branch of its New Delhi-based Investment Center. Aim: to quicken the flow of private investments into India.

The new center will probably help bolster a trend that's already evident: the movement of more and more U.S. companies into India. Last year 42 U.S. companies concluded financial and technical collaboration agreements with their Indian counterparts, pushing total U.S. investments in India over the $200-million mark. During the first three months of this year, the Indian government approved 101 foreign tie-ups, including 14 with U.S. companies.

Between 1955 and '59, total private foreign investment in India swelled from $957.6 million to $1.28 billion, while U.S. companies increased their stake from $82.1 million to $172.2 million.

CPI Moves In: With the chemical industry pegged for a key place in India's development plans, U.S. chemical producers are playing an increasingly prominent role in this investment influx. Recent figures aren't available, but the trend is clear when you look at some of the projects already con-



structed or currently under way.

Last spring Union Carbide's Indian subsidiary started up its plant on Trombay Island, near booming Bombay. Output: 15 millions lbs./year of polyethylene resins and compounds, acetic acid, butyl alcohol, butyl acetate, ethyl acetate, etc., taking its raw materials primarily from the Maharashtra state government's Chitali sugar cane distillery. Expansion plans are already in the works.

At Bareilly, Uttar Pradesh, Firestone's affiliate is building a 20,000-tons/year plant to produce, starting next year, styrene, butadiene, and 20,000 tons/year of SBR rubber, also using alcohol as the starting material. The plant—India's first synthetic rubber producer—will be operated by Synthetics & Chemicals Ltd., which was recently formed by Firestone and its Indian partner, Kelachand Devchand & Co.

Firestone's plant will form a piece of an industrial mosaic to which other U.S. companies will also contribute. Firestone already manufactures tires in India. Now Goodyear, which has had its tires produced in Dunlop plants under a licensing agreement, has built a plant of its own. And Mansfield Tire & Rubber Co. is slated to collaborate in a tire plant with The Madras Rubber Factory, which won a government license* for the scheme late last year.

Meanwhile, Phillips Petroleum plans to collaborate in several related schemes with Duncan Brothers. The two companies are setting up India's first carbon black plant (aside from D. Waldie & Co's 1,000-tons/year furnace black plant) near the steel mill at Durgapur, and they may help launch India's petrochemical industry by building polyethylene and synthetic rubber plants, using natural gas from the Assam oilfields. Duncan got licenses for the latter projects in February. Another carbon black plant—a 22-million-lbs./year unit—is slated for construction by P. J. B. Industries, which plans to get technical help from Continental Carbon, the Witco-Continental Oil subsidiary. It would go up in Assam, would be India's

* A license gives preliminary approval to a proposed project, which still needs final approval when all details are worked out.

first gas furnace carbon black plant.

U.S. producers are playing a big part in the development of India's pharmaceutical industry. Pfizer's tetracycline and Terramycin plant was India's first fermentation unit. And American Cyanamid will also soon move from formulating into basic production. Its subsidiary, Lederle Laboratories (India) Pvt. Ltd., will soon put onstream its tetracycline and chlortetracycline unit at Bulsar. In the next few weeks, the affiliate will be reorganized, with Atul Products getting 24% interest. Atul, in which Cyanamid holds 10% interest, supplies many of Lederle's raw materials from its adjacent plant. (Cyanamid supplied the technology for much of Atul's dyestuff and pharmaceutical processing.)

Next year Merck Sharp & Dohme (India) will start up its $8-million Bombay plant to produce vitamin B_{12}, steroids, and other products. Merck & Co. owns 60% of the company, India's Tata & Sons the rest. Merck won government approval for the plant after it agreed to supply (for a royalty) the government's Hindustan Antibiotics Ltd. with technology for producing streptomycin and dihydrostreptomycin.

Other U.S.-backed projects are coming. Hercules, together with Distillers Ltd. of the U.K. and Bombay Dyeing, has won a license from the Indian government to form Herdillia Chemicals Ltd. Feasibility studies are under way. As plans now stand, Herdillia would build a plant to produce 10,000 tons/year of phenol, 6,000 tons of acetone, 16,000 tons of cumene, 10,000 tons of phthalic anhydride, and 5,000 tons of diacetone alcohol, and phthalates. India now produces no phenol and little phthalic.

Du Pont will supply technical know-how for India's first synthetic camphor plant, to be built by Camphor & Allied Products Ltd. near Bareilly in Uttar Pradesh. American Hydrotherm Corp. will engineer and construct the plant and supply some of the capital for the publicly held venture. The engineering company, incidentally, may form an Indian associate company.

After a long period of negotiating, International Minerals & Chemical Corp. and California Chemical Co. won a license with the E.I.D. Parry group of Madras to build an 80,000-tons/year nitrogen fertilizer plant at Visakhapatnam. More hard bargaining seems in the cards before the plant becomes a reality.

In other developments, Vitro Corp. may supply technology and some capital to Khatau Makanji Spinning and Weaving Co. for building a plant to produce 35,000 tons/year of methyl alcohol and 30,000 tons of formaldehyde. The companies have applied for a license, plan to set up the plant at Borivli (an industrial suburb of Bombay), and use naphtha and fuel oil from Bombay refineries.

Crown Zellerbach and The Hawaiian Development Co. have signed an agreement with Sahu Jain (Calcutta) to provide technical help and patent rights for a 60,000-tons/year newsprint-from-bagasse plant. Mississippi Glass Co. (St. Louis) is joining with Hindustan Wired Glass Manufacturing Co. to build a glass plant near Baroda, in Gujarat. Struthers Wells Corp. (Titusville, Pa.) is now seeking Indian government approval to form a company with Mapara Engineering Co. (Bombay) for building a chemical and petroleum equipment plant. And Stanvac has been considering putting up a complex next to its Bombay refinery to produce ethylene, propylene, butylene, butadiene, benzene, etc.

Chemical Aid from Abroad: European producers are also taking a big hand in India's chemical development. A German consortium of BASF, Bayer, Hoechst and Hoechst's subsidiary, Friedrich Uhde, are supplying engineering know-how (in exchange for a 10% interest) for the Indian government's biggest single chemical project slated in the third Five-Year Plan—the $26-million Basic Chemicals and Intermediates (BCI) plant going up near Panvel in Maharashtra state. It will turn out 40 intermediates products (dyes, varnishes, rubber auxiliary agents and pharmaceuticals) with an aggregate output of 25,160 tons/year, which is to be expanded eventually by about 15,000 tons.

Another German producer, Dr. Paul Lohmann Chemische Fabrik, will reportedly form an Indian company —Dr. Paul Lohmann (India) Ltd.—to produce 3,360,000 lbs./year of organic and inorganic chemicals.

Italy's Montecatini is involved in several Indian projects. It supplied the technology for the government's Sindri nitrogen fertilizer plant and for its Neiveli plant under way. And it will design and supply complete know-how for a 10,000-tons/year aluminum plant in Madras, for The Madras Aluminum Co., formed by the Indian government, private groups, and Montecatini.

Italy's government trust, ENI, will be playing a big role in India. It has extended the Indian government a $100-million credit, to cover oil lines, a gas fractionation plant, a lubricating oil plant, and possibly a complete refinery. It will also carry out feasibility studies for a petrochemical plant.

Yugoslavia will supply plant and equipment for a $3.4-million nylon plant to go up in Punjab State. Yugoslavia will buy the equipment from West Germany, accept rupee payments from India. French, Norwegian and Japanese interests are also supplying capital and technology for Indian process industries projects.

Red Aid: The Soviet bloc is using chemical project aid to help build up its influence in India. Russia is supplying credit and technology for three drug plants: the Sanatnagar synthetic drugs project (sulfa drugs, vitamins, phenacetin, other synthetic drugs — isoniazide, luminal, chloroquin, etc. — and intermediates; the Rishekesh Antibiotics plant (penicillin, streptomycin, chloro- and other tetracyclines, new antibiotics); and the phytochemical plant in Kerala (caffeine, ephedrine, digitalis, glycosides, lanatazides ergot alkaloids, atropine, scopolemine, reserpine, papin, vitamin P.). Russia is also supplying a pair of 2-million-tons/year oil refineries (one under construction) and an optical glass plant, a steel plant, plus large projects outside of the CPI. It has also offered loans to private companies.

Other Soviet bloc members are pitching in. Hungary has offered $16.8 million in credits to cover, among other things, production of

Chemical and Pharmaceutical Firms in India

Firm and Location	Foreign Collaborator	Product
Adarsh Chemicals & Fertilizers Ltd. (Gujarat)		Sulfuric acid, hydrochloric acid, nitric acid, etc.
Alembic Chemical Works Co., Ltd. (Gujarat)		Chemicals, pharmaceutical preparations, sulfuric acid, etc.
Alkali & Chemical Corp. of India	Imperial Chemical Industries	Heavy chemicals, nitrocellulose paints, synthetic finishes
Amar Dye Chemical Ltd. (Bombay)	ACNA (Italy)	Basic and acid dyes
Abbott Laboratories (India) (Pvt.) Ltd. (Bombay)	Abbott Laboratories	Vitamins, etc.
Andhra Pharmaceutical Works, Ltd. (Andhra)		Pharmaceuticals
Asiatic Oxygen & Acetylene Co. Ltd. (West Bengal)	L'Air Liquide (France)	Acetylene, other gases
Atul Products Ltd. (Bulsar)	American Cyanamid	Dyes, pharmaceuticals, chemicals
Benger Laboratories India (Pvt.) Ltd. (Calcutta)	Fisons Ltd. (U.K.)	Drugs
Biological Products (Bombay)	Medimpex (Hungary)	Pepsin, pepton, pancreatin
Boehringer Knoll (Pvt.) (Bombay)	Boehringer & Sochne	Chloramphenicol, other pharmaceuticals
Boots Pure Drug Co. (Bombay)	Boots Drug Co. (U.K.)	Pharmaceuticals
British Drug House Ltd. (Bombay)	British Drug Houses (U.K.)	Pharmaceuticals
Burma Lime & Chemical Co. Ltd. (West Bengal)		Chemical lime, calcium and magnesium compounds
Camphor & Allied Products Ltd. (Uttar Pradesh)	American Hydrotherm, Du Pont	Synthetic camphor
Chemical, Industrial & Pharmaceutical Laboratories		Fine chemicals, pharmaceuticals
Chemicals Ltd. (Madras)		Light basic and fine chemicals of potassium, sodium, etc.
Chemo-Pharma Laboratories Ltd. (Bombay)		Chemicals, pharmaceuticals
Chika (Pvt.) Ltd. (Bombay)	Chemische Werke Huels	Acetic acid
Coimbatore Chemicals & Fertilizers		Fertilizers
Colour-Chem Ltd. (Bombay)	Farbenfabriken Bayer, Farbwerke Hoechst (West Germany)	Pigments, dyes, chemicals, fertilizer
Calcutta Chemical Co. Ltd. (West Bengal)		Chemicals, soaps, etc.
Ciba Pharma (Bombay)	Ciba (Switzerland)	Pharmaceuticals
Ciba Dyes (Pvt.) Ltd. (Bombay)	Ciba	Dyes and chemicals
R. A. Cole (Pvt.) Ltd. (Bombay)	Badische Anilin- & Soda-Fabrik (West Germany)	Polystyrene products
Delhi Cloth & General Mills, Co. Ltd. (Kotah, Rajasthan)	Shin-Etsu Chemical Industries & Mitsui Bussan Kaisha (Japan)	Polyvinyl chloride copolymers, caustic soda, calcium carbide
Dharamsi Morarji Chemical Co. Ltd. (Bombay)		Acids, heavy chemicals, fertilizers
Dhrangadhra Chemical Works Ltd. (Dhrangadhra, Bombay)		Soda ash, soda bicarbonate, calcium chloride, caustic soda
East Anglia Plastics (Calcutta)		Cellulose acetate molding powder, polyvinyl chloride
Fertilizers & Chemicals Travancore Ltd. (Kerala)		Ammonia, ammonia sulfate, superphosphate, sulfuric acid, etc.
Geigy Insecticides Ltd. (Bombay)	J. R. Geigy (Switzerland)	Insecticides,
German Remedies & Trading Co. (Pvt.) Ltd. (Bombay)	Produktenhandel Und Investierungs, Anstalt Schaan (Lichtenstein), Chemiework Hamburg, and Nordmark Werke	Sulfasomidine, etc.
Geoffrey Manners & Co. (Bombay)	Scrubb & Co. (U.K.)	Patent and proprietary drugs
Gladstone Lyall & Co. (Calcutta)	Geigy	Insecticides
Glaxo Laboratories (Bombay)		Vitamins, antibiotics
Group Laboratories India (Bombay)	Beecham Group (U.K.)	Cosmetics, fruit salts, etc.
Heavy Chemicals Ltd. (West Bengal)		Caustic soda, high-test hypochlorite, titanium tetrachloride, titanium dioxide, etc.
Hindustan Antibiotics Ltd. (Maharashtra) (government)		Penicillin, streptomycin
Hindustan Chemicals & Fertilizers Ltd. (Punjab) (government)		Nitrogen, heavy water, etc.
Hindustan Insecticides Ltd. (Delhi) (government)		DDT
Hindustan Heavy Chemicals Ltd. (West Bengal)		Acids, alkalis, etc.
[illegible]echst Pharmaceutical (Bombay)	Farbwerke Hoechst	Pharmaceuticals and fine chemicals
[illegible]erabad Chemicals & Fertilizers [illegible]d. (Andhra)		Pharmaceuticals
Indian Alkalies Ltd. (West Bengal)		Chemicals
Indian Carbide Corp. (Bombay)	L. C. Kaufman (U.K.)	Calcium carbide

Firm and Location	Foreign Collaborator	Product
Industrial Chemical Corp. (Pvt.) Ltd. (West Bengal)		Chemicals
Indian Dyestuff Industries Ltd. (Bombay)	ACNA (Italy)	Vat dyes
Indian Organic Chemicals Ltd.	Chemische Werke Huels	Acetic acid
Indian Oxygen Ltd. (West Bengal)		Oxygen, acetylene, nitrous oxide, hydrogen, nitrogen, etc.
Imperial Chemical Industries (Calcutta)	ICI (U.K.)	Dyes, chemicals
J. K. Chemicals Ltd. (Bombay)		Heavy chemicals, specialties
Lederle Laboratories (India) (Pvt.) Ltd. (Bulsar)	American Cyanamid	Vitamins, tetracycline, other antibiotics and pharmaceuticals
Major S. A. (Hakim, Madras)	A. Maschmeijer Jr. (Holland)	Artificial musks, aromatic chemicals, perfume compounds
May & Baker (Bombay)	May & Baker (U.K.)	Sulfa drugs
Mettur Chemical & Industrial Corp. Ltd. (Madras)		Caustic soda, chlorine bleach, soaps, etc.
Mysore Chemical Manufacturers Ltd. (Mysore)		Copper sulfate, sulfate of alumina, other heavy chemicals
Mysore Chemicals & Fertilizers Ltd. (Mysore)		Sulfuric and other acids, ammonia, ammonium sulfate, superphosphate, etc.
Meclec Nutriments & Pharmaceuticals Ltd. (Madras)		Pharmaceuticals and medicinals
Merck Sharp & Dohme (India) (Bombay)	Merck & Co.	Vitamin B_{12}, diuretico- and corticosteroids
National Peroxide Ltd. (Bombay)		Hydrogen peroxide, fine and heavy chemicals
Neo Pharma Industries (Pvt.) Ltd. (Bombay)	Archifer (Milan)	Chloramphenicol
Nilgiri Fertilizers Ltd. (Madras)		Fertilizers
Nivea Pharmaceuticals (Calcutta)	Herts Pharmaceuticals (U.K.)	Antituberculosis drugs
Nowrojee Wadia & Sons (Calcutta)	John & E. Sturge Ltd. (U.K.)	Precipitated calcium carbonate
Nowrojee Wadia & Sons	Laporte Industries Ltd. (U.K.)	Titanium dioxide
Parke, Davis Ltd. (Bombay)	Parke, Davis	Antibiotics, vitamins, etc.
Pfizer (Pvt.) Ltd.	Chas. Pfizer	Processing vitamins, antibiotics, specialty drugs
The Phosphate Co. (West Bengal)		Fertilizers, sulfuric acid, etc.
Pioneer Chromate Works (Bombay)		Potassium and sodium bicarbonates
Pioneer Magnesia Works Ltd. (Bombay)		Salt, magnesium chloride, magnesium sulfate, potash salts, bromine, chlorine, etc.
Polychem Ltd. (Bombay)	Dow	Polystyrene, etc.
Phillips Carbon Black Ltd. (Calcutta)	Phillips Petroleum	Carbon black
Pigments & Dyestuffs (Pvt.) Ltd. (Bombay)	Sanyo Colour Works (Japan)	Organic pigments
Roche Products (Pvt.) Ltd. (Bombay)	F. Hoffmann-La Roche (Switzerland)	Pharmaceuticals
Sahu Chemicals (Varanasi)		Nitrogen fertilizer
Sandoz Products Ltd. (Bombay)	Sandoz (Switzerland)	Vitamins, Pharmaceuticals
Sanitex Chemical Industries Ltd. (Gujarat)		Pharmaceuticals, fine chemicals, metallic stearates, etc.
Sarabhai Chemicals (Pvt.) Ltd. (Ahmedabad)	E. Merck (West Germany) Geigy (Switzerland) E. R. Squibb	Pharmaceuticals
Sardesai Brothers Ltd. (Bilimora)		Carboxymethyl cellulose
Sindri Fertilizers & Chemicals Ltd. (Bihar) (government)		Ammonium sulfate, urea, fertilizers, etc.
Smith & Nephew Associated Co.'s (Bombay)	Smith & Nephew (U.K.)	Plaster of paris, surgical adhesives, etc.
Suhrid Geigy Ltd. (Baroda)	J. R. Geigy (Switzerland)	Pharmaceuticals
Synthetics & Chemicals Ltd. (Bareilly, Uttar Pradesh)	Firestone Tire & Rubber	Styrene, butadiene, rubber (SBR)
Tata Chemicals Ltd. (Bombay)		Heavy chemicals, pharmaceuticals, insecticides, specialties
Tata Fison (Pvt.) Ltd. (Bombay)	Fisons (U.K.)	Insecticides, etc.
Techno-Chemical Industries Ltd. (Kerala)		Soaps, disinfectants, etc.
Textile Pigments Ltd. (Bombay)	Bayer	Pigments, binding materials
Travancore Chemical & Manufacturing Co. Ltd. (Kerala)		Heavy chemicals—potassium chlorate, copper sulfate, ammonia sulfate, etc.
Travancore-Cochin Chemicals Ltd. (Kerala) (government)		Carbon and graphite materials, electrochemicals, etc.
Union Carbide India Ltd. (Trombay Island)	Union Carbide	Polyethylene, acetic acid, butyl alcohol, butyl acetate, ethyl acetate, etc.
Unichem Laboratories (Bombay)	Union Chemique Belge (Belgium)	Antihistamines, tranquilizers
Valia Brothers (Bombay)	Nippon C.M.C. (Japan)	Sodium carboxymethyl, cellulose
Whiffens (India) (Calcutta)	Whiffens (U.K.)	Pharmaceuticals
Zandu Pharmaceutical (Bombay)		Ayurvedic and allopathic pharmaceuticals

drugs and exploration of bauxite reserves, and is helping set up a chemical equipment plant. And East Germany will supply a 10,000-tons/year calcium carbide plant in Kerala.

Rapid Progress: All of these schemes fit into India's program for reaching industrial self-sufficiency, as laid out in the second and third Five-Year Plans. The third plan started in April.

Despite some severe problems, India's chemical industry has made notable strides. Over the last 10 years, output rose about 288%. During the second plan period (covering fiscal years '55-'65 through '60-'61), the chemical production index shot up from 179.3 to around 288, representing a 12%/year average increase in output. And this understates the actual rise, because the index doesn't take into account many new products.

During the second plan period, India started producing a number of new chemicals, including calcium carbide, hydrogen peroxide, explosives, rubber chemicals, sodium hydrosulfite, etc.

For all these gains, chemical output fell short of the second plan goals. Although the capacity target was exceeded for soda ash, decreases were registered for the other chemicals listed in the plan. Nitrogen fertilizer capacity, for example, came to only 248,000 tons, instead of the 382,000 tons targeted, and phosphate fertilizer capacity reached only half of the scheduled 120,000 tons. Sulfuric acid capacity reached 476,000 tons instead of 500,000, caustic soda 124,000 instead of 150,424, calcium carbide 17,000 instead of 24,000, sodium hydrosulfite 2,300 tons instead of the 4,000 or more expected.

In fact, the levels actually reached in production and capacity in the '60-'61 fiscal year were generally lower than estimated when the third plan draft was published a year and a half ago (*CW, July 23, '60, p. 24*). Nitrogen fertilizer output was only 110,000 tons instead of the estimated 210,000 tons, sulfuric acid output was only 363,000 tons instead of 400,000, soda ash 145,000 instead of 240,000, plastics 10,000 tons instead of 11,500, etc.

At the root of much of this shortfall was the foreign exchange shortage, which prevented producers from importing necessary raw materials, and led to a cutback or delay of projects. According to the *Economic Times* of Bombay not much more than 50% of capacity was used during '60 by one-third of the units on which data is available. Another third operated on an average of not more than 75% of capacity.

The crimp is especially tight for drugs, dyestuffs and other organic chemical products for which intermediates have to be imported, and will continue to be, at least until the government's intermediates plant goes onstream. Atul's chairman, Kasturbhai Lalbhai, recently told his stockholders that raw material supplies had been "hand to mouth for some time," and that "hampered production will have to be considered as a constant phenomenon." Atul's import license was recently cut 20%, and the company is now trying to buy its raw materials from those countries (mostly Communist) which accept payment in rupees.

Forging Ahead: Nevertheless, India plans to forge ahead with her chemical goals. Over the last five years, an estimated $252 million was invested in the chemical industry. The third plan envisions an investment more than twice as large—$630 million. Despite underproduction that cropped up during the past year, the final draft of the plan calls for about the same goals as set forth in the draft issued in June '60. Output of nitrogen fertilizer is supposed to rise 627%, to 800,000 tons (instead of the 1 million tons originally planned); phosphate fertilizer output is also slated for a 627% rise; sulfuric acid output is now slated for a 313% rise, to 1.5 million tons (up from the original goal of 1.25 million tons); soda ash output is slated to rise 210%, caustic soda 240%, sulfa drugs 567%, plastics 640%.

While private industry will be heavily relied on to reach the targets, a number of major projects will be tackled by the central and state governments. Already under way are the three Soviet-aided drug projects, the BHC organic intermediates plant, the expansion into streptomycin and tetracycline production of Hindustan Antibiotics, and the nitrogen fertilizer plants at Trombay, Nahorkatiya, and Neiveli. New central government projects for which credits have been wholly or partly assured include ophthalic glass and raw film plants at Durgapur, a basic refractories plant at Bhilai, and another nitrogen fertilizer plant at Gorakhpur. Expansion of the Fertilizers & Chemicals (FACT) nitrogen fertilizer plant at Alwaye, Kerala, is also planned. Also on tap: salt development, expansion and modernization of the alkaloid plant at Ghazipur, a lubricating oil plant, low-temperature carbonization plants with a capacity of 2.2 million tons of coal, and a lignite high-temperature carbonization plant at Neiveli.

State governments are slated for other new projects and expansions:

In Mysore, expansion of the Iron and Steel Works ferrosilicon plant; in West Bengal, construction of a tar distillation plant at the Durgapur coke ovens and doubling of the coke ovens and by-products plant; in Bihar, expansion of the Sindri superphosphate factory; and, provisionally, a new nitrogen fertilizer project; in Uttar Pradesh, a refractories plant; and in West Bengal, an organic chemicals plant at Durgapur to produce caustic soda, phenol, chlorine, phthalic anhydride, formaldehyde and pentachlorophenol.

Sulfuric acid output has been based on sulfur; part of the capacity slated in the third plan will be linked to by-product gas from zinc and copper smelters and to Amjor pyrites. The caustic and soda ash targets aim to make India self-sufficient in these products; most of the development is left to the private sector. Also in the inorganic sector, expansion is called for in titanium dioxide, calcium carbide, sodium hydrosulfite, sodium sulfate, potassium hydroxide, and barium chemicals.

The organic chemical sector will get its first major boost. Provisional capacity targets have been set for phthalic anhydride, 15,000 tons; phenol, 15,000 tons; and methanol, 40,-

Hot sun causes some vinyls to give off volatiles that "fog" windows. Bar-O-Sil stabilizer inhibits this condition.

Tests show Bar-O-Sil* stabilizer inhibits troublesome "fogging" of car windows due to vinyls

Bar-O-Sil supplementary stabilizer also checks spewing, crocking, plating and blocking in processing of vinyl film, sheeting and extrusions.

Car manufacturers noted that heat causes some vinyl upholsteries to give off volatiles that "fog" windows. Tests show that Bar-O-Sil, complex barium silicate supplementary stabilizer, inhibits this condition in vinyls. In addition to alleviating this problem, Bar-O-Sil promotes the following desired characteristics in vinyl film, sheeting and extrusions.

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In all stabilizing systems containing barium, cadmium or zinc compounds, Bar-O-Sil reduces plate-out on rollers during calendering. In this way, Bar-O-Sil saves time by permitting quick color changeovers, and speeds production runs.

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The Next Five Years—India's CPI Goals

Product	Unit	1960-61 Fiscal Year Production	1960-61 Fiscal Year Capacity	1965-66 Fiscal Year Production	1965-66 Fiscal Year Capacity
Nitrogen fertilizer (N content)	1,000 tons	110	248	800	1,000
Phosphatic fertilizer (P_2O_5 content)	1,000 tons	55	60	400	500
Sulfuric acid	1,000 tons	363	476	1,500	1,750
Soda ash	1,000 tons	145	268	450	530
Caustic soda	1,000 tons	100	124	340	400
Calcium carbide	1,000 tons	10	17	60	67
Sodium hydrosulfite	1,000 tons	0.6	2.3	10	12
Hydrogen peroxide	1,000 tons	1.2	3	8	9.5
Carbon black	1,000 tons			30	30
Explosives, blasting	1,000 tons	5	6	20	20
Explosives, liquid oxygen	1,000 tons	2	2	9	9
Rubber chemicals	1,000 tons	n.a.	2	3	3
Soft coke (low-temperature carbonization)	1,000 tons			1,800	2,000
Hard coke by-product	1,000 tons	500	620	1,100	1,160
Dyestuffs	million pounds	11.5	18	18	22.4
Organic intermediates	1,000 tons			25	25
Sulfa drugs	tons	150	330	1,000	1,000
Penicillin	million mega units	40	45	120	205
Streptomycin	tons			150	150
Salicylic acid	tons	100	145	400	400
Antidysentery drugs	tons	30	60	75	75
Isoniazid	tons	30	33	100	100
Phytochemicals	tons			76.4	76.4
DDT	tons	2,800	2,800	2,800	2,800
Plastics	1,000 tons	10	15.7	74	85
Synthetic detergents	1,000 tons	1.5	7.2	20	20
Raw films (cinematic, etc.)	million square meters			10	10
Auto tires	millions	1.35	1.61	3	3.7
Bicycle tires	millions	11	16.9	31	38.6
Synthetic rubber	1,000 tons			50	50
Paper, paper board	1,000 tons	350	410	700	820
Newsprint	1,000 tons	25	30	120	150
Security paper	tons			1,500	1,500
Cement	million tons	8.5	9	13	15
Refractories	million tons	0.52	0.67	1.6	2
Glass, glassware	1,000 tons	225	370	440	615
Petroleum products	million tons	5.67	6.02 (crude oil)	9.86	10.77 (crude oil)
Lubricating oils	1,000 tons			100	100
Power and industrial alcohol	million gallons	22	40	60	72
Oxygen	million cubic feet	700	1,000	1,650	2,300
Acetylene	million cubic feet	90	156	200	250
Rayon filament	million pounds	47	52	140	140
Staple fiber	million pounds	47.8	48	75	75
Chemical pulp	1,000 tons			90	100

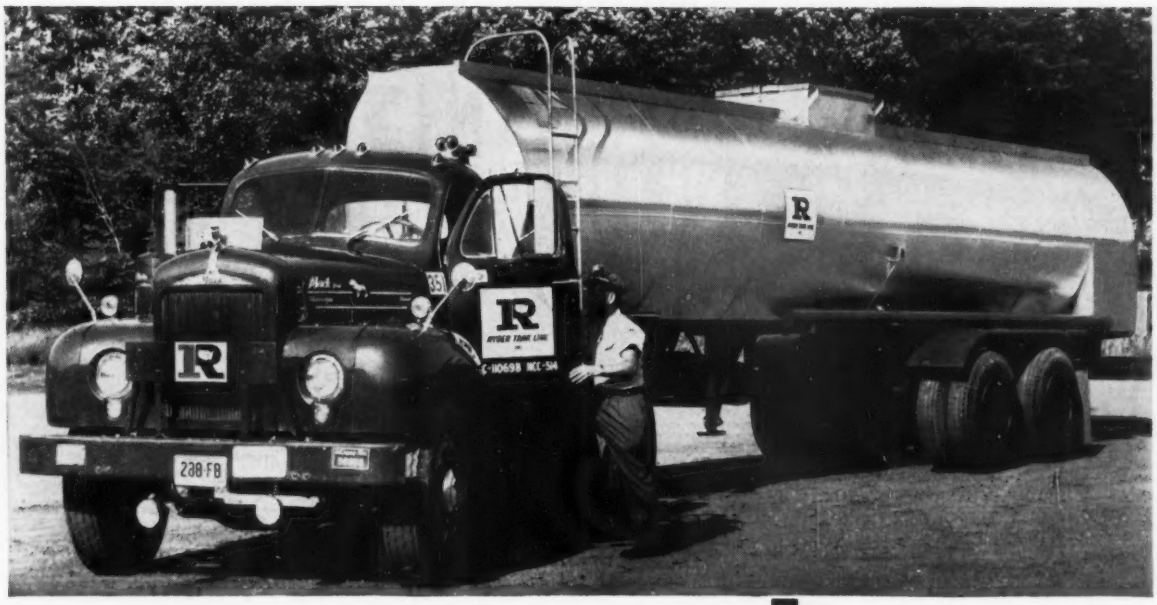
000 tons. Production of vinyl chloride and styrene, butadiene, carbon black and rubber chemicals, butyl alcohol and its esters, citric acid and oxalic acid will be produced for the first time in the private plants. In the public sector, the BCI plant will mark a major step toward self-sufficiency.

In plastics, polyolefins are "proposed" to account for 27,000 tons of the planned 85,000-tons capacity. Polystyrene and polyvinyl chloride are also marked for important growth. The introduction of ethylene from petroleum instead of alcohol will mean cost cuts, and could lead to an upward revision of capacity, with export markets in mind.

Fertilizers First: With India's agricultural productivity critically low and self-sufficiency in food grains the goal for '65-'66, fertilizer plants will account for the largest share of chemical industry investment.

So far the record has been sadly disappointing. The '60-'61 consumption target for nitrogen fertilizers was 500,000 long tons (N content). According to the FAI Information Service, consumption was only half of that—236,200 long tons—while output came to only 76,800 long tons, with the result that even though not enough fertilizer was used, valuable foreign exchange was spent importing most of even the inadequate amounts that were consumed. Superphosphate consumption came to only about a third of the 150,000 tons (P_2O_5) target. Here the problem was to get the farmers to use the material. Producers (production is in the private sector) found themselves with overcapacity.

The Indian government expects demand to swell to 1 million tons (N) and 400,000 tons (P_2O_5) by '65-'66. It expects to have built by that time 1 million tons of nitrogen fertilizer capacity and 500,000 tons of phosphatic, to actually produce 800,000 tons of the nitrogenous material and 400,000 of the phosphatic. But industry men are skeptical that these goals will be met. Agronomist Vincent Sauchelli, for example, estimates that not more than 500,000 tons of nitrogen can be produced domesti-



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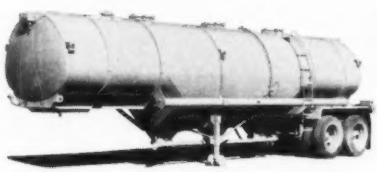
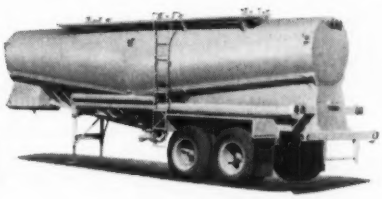


HOPPER PRESSURE-TYPE TANK-TRAILER—for high-discharge unloading of salts, granular phosphates, ammonium nitrate prills, granular fertilizer components, as well as cement.



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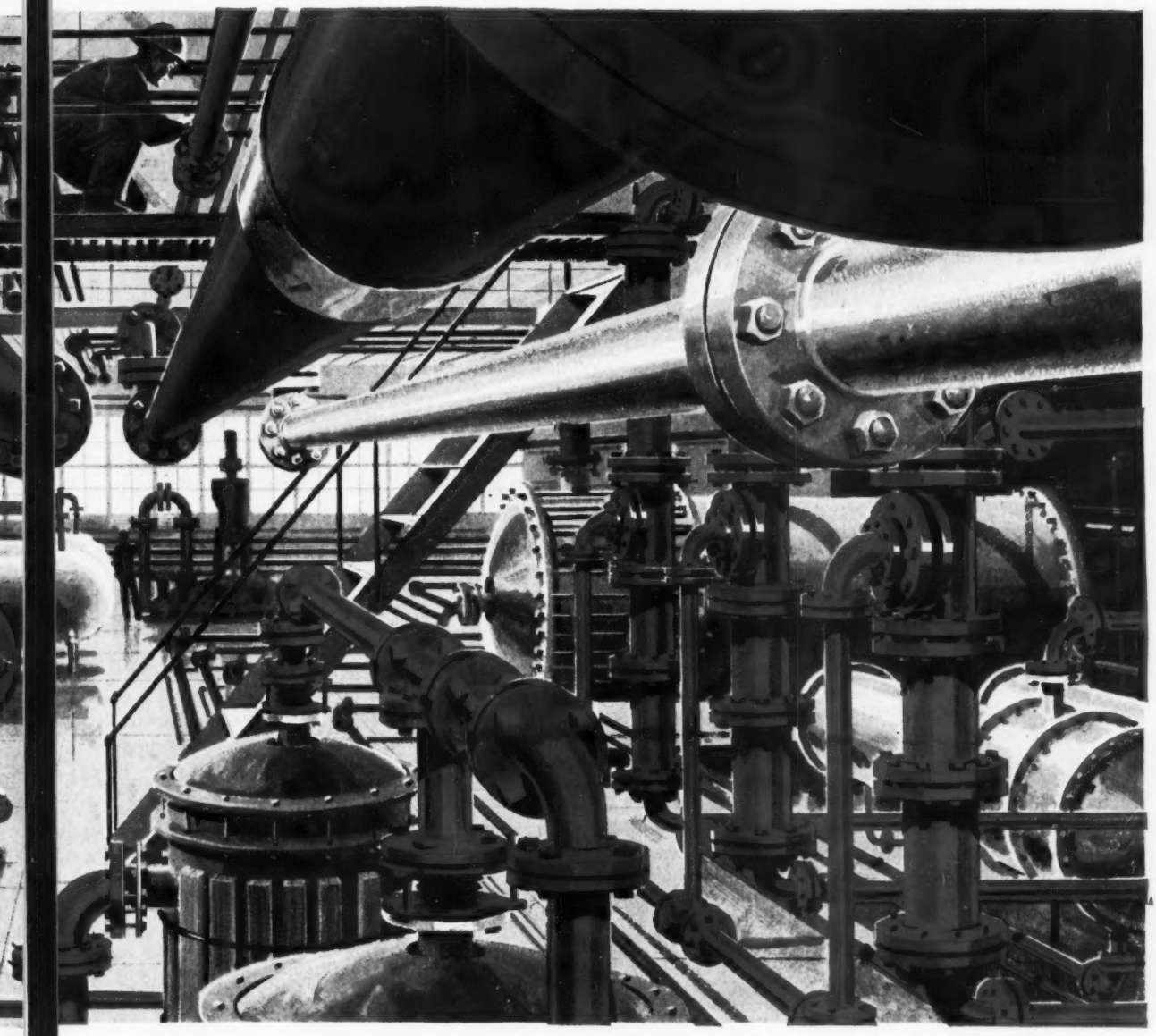

PRODUCT LOSSES

annealing—minimizes the need for gaskets, hangers, supports, and anchors as required for non-metallic piping.

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cally by the target date and notes that present and proposed phosphate plants will be able to produce at most only 296,000 tons.

There are various reasons for the failure to meet output goals. The foreign exchange crisis is one. Also critical, a UN mission found, was the time wasted in building plants. It takes 17-24 months longer than "warranted" to plan, build and commission a plant, and a lot of time is wasted in reaching decisions about projects, both in the public and private sectors. Moreover, the mission found, fertilizer plants are overstaffed with technical personnel, even though such experts are in short supply elsewhere.

Other bottlenecks have slowed output. Sulfuric acid shortages, for example, hampered superphosphate production. As a result of the disappointing output of its Sindri nitrogen fertilizer plant, the government brought damages against Montecatini, the contractor. But Montecatini counters that the production shortage was not primarily the result of any lack of the plant's capacity, but resulted in part from a shortage of coke-oven gas feedstock, and its impurity, which caused a delay while a scrubbing unit was built.

And now the nitrogen plant to be built at Visakhapatnam by Parry, I.M.C. and California Chemical may be delayed by a feed-stock shortage. The government has frozen crude imports of private oil refineries at the '60 level. Caltex, which is supposed to supply the fertilizer with naphtha from its local refinery, says it won't be able to supply enough unless it can expand.

Wary Foreigners: When it drew up its draft outline for the third plan, the government planned to expand public sector nitrogen fertilizer capacity to 800,000 tons, with private companies taking up the other 200,000. Since then, it decided government plant capacity would probably fall short of the original goal, and that private plants should take up the slack.

Although India's huge fertilizer potential attracted the interest of a flock of U.S. companies, only IMC and California Chemical have come close enough in agreement with the Indian government to secure a license. (Licenses have also been issued to a few Indian companies for projects, but they must still find foreign collaborators.)

The major reason for India's failure to attract enough foreign fertilizer producers has been its marketing setup. All nitrogen fertilizers, locally produced and imported, are taken up at a fixed price and distributed by the government's fertilizer pool. Private producers object that this gives them unsatisfactory profits, want to handle their own sales. To answer this criticism, the government is studying a scheme whereby a marketing corporation would be run like a private company with private producers holding a minority share. Industry men, however, are skeptical that this would have a practical effect very much different than the present setups.

Open Door: Whatever the problems and snags, India's headlong rush of chemical development is bound to attract more and more investors. Aside from the bare fact of market opportunities, an important factor encouraging this investment has been the changed attitudes on the part of both the Indian government and private businessmen, especially U.S. businessmen.

India has set out to create a "socialist" state. But as its leaders grapple with the enormous economic problems their country faces, they become considerably more "pragmatic"—willing to get the job done as best they can. This has meant opening more and more industrial areas to private industry. They have not overlooked the evidence of their "private sector's" dynamism, especially as the new class of industrial leaders gains more influence.

U.S. companies, on the other hand, have grown increasingly confident about operating in a government-controlled economy — their sophistication has developed with their growing experience in international business.

The government of India has taken several steps recently to open the doors wider to private industry. A number of its incentives — such as the five-year tax holiday on foreign investment—are already well known. In the new budget issued earlier this year, new tax incentives were extended, including slashing taxes on new bonus issues, leveling the supertax on intercorporate investment dividends to a fixed 20%; cutting tax rates on royalties paid to foreigners, etc.

In another important move, the government this summer cut the red tape involved in screening industrial investment proposals. Instead of being shunted through a raft of agencies they now are handled by a senior officer in the Commerce and Industry Ministry.

The setting up of the Investment Center as a semiofficial, autonomous unit under former U.S. Ambassador Shri G. L. Mehta earlier this year was another move to make it easier for investors to launch projects. Its New Delhi office is staffed with a large group of specialists, including a chemical engineer, who can prepare studies on investment possibilities for prospective investors. The center will also advise on regulations and procedures, help in putting together licensing applications, finding partners for Indian and foreign investors, etc.

Optimistic Outlook: U.S. businessmen already active in India are enthusiastic about its prospects. Plenty of grave economic and political problems remain. Communist China looms as an ever present threat. Dissension is growing within the ruling Congress party, and the question of who will hold the country together after Prime Minister Nehru leaves is still unanswered. The country is divided—often violently—by its multitude of religious, regional, language, and caste differences. Though industrial progress is substantial, it's still nip and tuck whether the desperately low standard of living can be raised fast enough to avoid a surge toward a less democratic form of government. China could become an example as well as a threat.

U.S. businessmen see these problems. But they look at the progress India has made so far, and figure that on the whole the outlook is good

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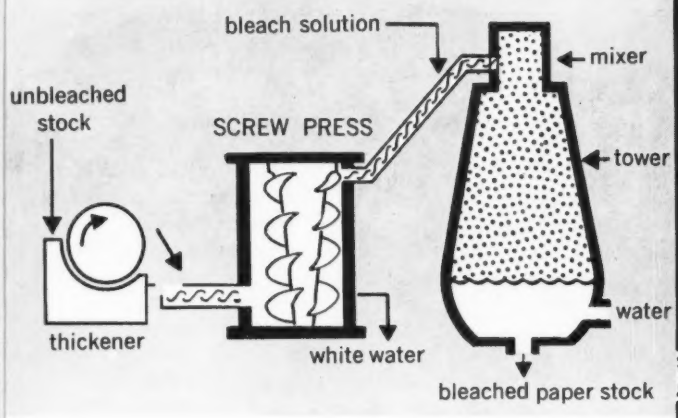
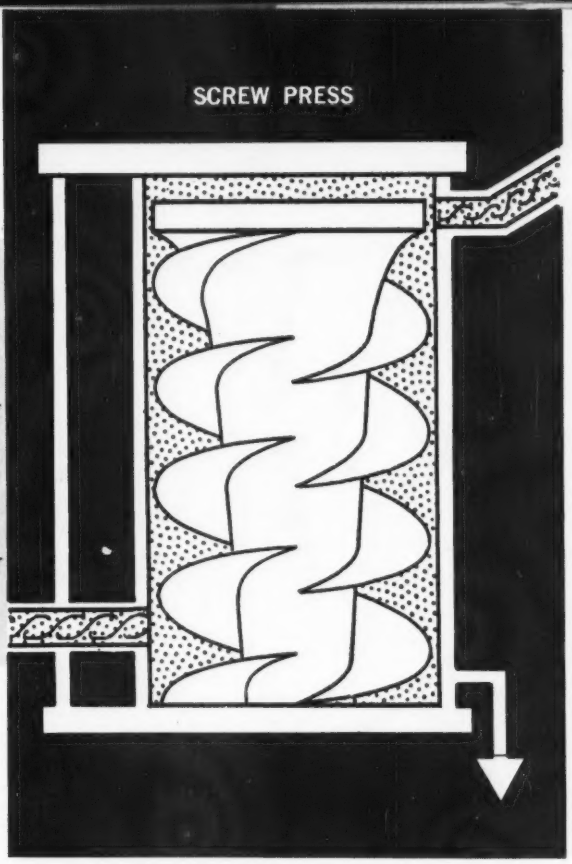
FMC Press: Key to High-Density Bleaching





Squeezing Out New Savings for Pulpers

St. Regis Paper Co. has proved out a new process for "high-density" bleaching of groundwood pulp with hydrogen peroxide, and is putting it to work in a 120-ton/day plant at its Deferiet, N.Y., mill.

Details of the process, which saves on chemicals (*see Dimension, p. 82*), were disclosed this week in Chicago at the Mechanical Pulping Conference sponsored by the Technical Assn. of the Pulp and Paper Industry.

The savings can pay off investment costs in less than three years. That's why it's under close study by most of the 87 groundwood and 48 semichemical pulp mills currently operating in the U.S. The groundwood mills alone hold a potential market for more than $2.5 million/year worth of hydrogen peroxide.

Key to the new process is a continuous screw press (*diagram, above*), which dewaters the pulp as it is fed to the bleaching plant. It is this operation that yields the dry pulp essential to superior hydrogen peroxide bleaching.

For years, separating unbleached pulp from the white water that carries it out of the wood grinding and wash plant has presented problems. Part of the water can be drained off through continuous screens by vacuum suction. But presses must be used to squeeze the pulp to the crumblike consistency needed for "high-density." Lack of suitable presses has held back the high-density process, although disc presses have proved successful in small-capacity operations. The Deferiet plant is believed to be the first installation using a continuous high-capacity (50 tons/day) screw press.

The press at Deferiet was developed by Canning Machinery Division of FMC Corp. (formerly Food Machinery and Chemical Corp.). And Canning worked closely with FMC's Becco Division—hydrogen peroxide producer—in developing the unit. Its press is said to dewater paper stock from 12% to more than 30% air-dry pulp. Most important, 10 months of operation have shown that this press does not form hard knots of fiber between the moving parts; such knots end up as "fish eyes" in the finished paper.

Triple Play: Three of these presses operate at Deferiet. The press's tapered spindle is surrounded by a projecting spiral of flat metal with interrupted flights—all mounted inside a cylindrical screen frame. As the spindle rotates, the spiral carries the pulp upward through an increasingly smaller gap between the spindle and the screen. Instead of being rigidly fixed, the spindle is free to float in a vertical direction, so that a pneumatic pressure regulator at the top can control the amount of "squeeze." This increases as the pulp rises. Horizontal breaker bars projecting inward from the screen prevent the pulp from merely rotating with the spindle.

As the pulp travels upward and is compressed, the white water passes out through the screen and falls into a collecting pan at the bottom. This gives counterflow of pulp and water, is said to avoid resaturation and product channeling.

The Process: Except for the unique screw press, the Deferiet process is typical of those known to pulp manufacturers as the "continuous high-density tower system." In this process, paper stock containing about 4% dry pulp in white water slurry is fed to a vacuum thickener, which pulls white water inward through a rotating screen cylinder.

The pulp stock that mats onto the rotating screen is continuously scraped off (pulp content, 7-15%) and fed through a screw conveyor to the bottom of the FMC screw press.

The stock leaves the top of the screw press as crumbs or nodules, is fed through a second screw conveyor to a disc mixer, where it is blended with the hydrogen peroxide bleach

solution. This consists of 50% hydrogen peroxide and silicate of soda proportioned to give concentrations of 1-1.5% hydrogen peroxide and 4-6% silicate on the basis of dry pulp in the stock.

From the mixer, the stock falls into the bleaching tower, which steeps the pulp in the bleach solution for about one and a half hours at 100 F. Near the bottom of the tower, which is flared outward to keep the crumbly pulp from bridging, water jets and a sluice agitator once again reduce it to a liquid slurry, which is metered into neutralizing and storage bins.

Dry Pulp and Peroxide: Hand in hand with high-density bleaching goes peroxide bleaching. Other chemicals (chlorine, hypochlorite, bisulfite, hydrosulfite, etc.) require water for solution and uniform blending with the pulp, whereas the efficiency of hydrogen peroxide bleaching is radically improved as drier pulp is processed. One of the latest commercial bleaching chemicals, peroxide was first employed in the U.S. in '41, today is used in about 35 U.S. groundwood pulp mills.

Groundwood's Growth: Assuming the mechanics of high-density bleaching are no problem, hydrogen peroxide bleaching still depends on (1) marketing future for groundwood pulp (2) inroads by continuous high-density bleaching with hydrogen peroxide into pulping processes such as semichemical, sulfite, kraft.

Providing costs can be held equivalent to that of other methods, groundwood pulp is a natural for hydrogen peroxide bleaching systems. Because it is mechanically reduced from spruce, pine, fir, Western hemlock, etc., it still contains most of the lignin and wood chemicals that are removed from chemical pulps.

Presence of wood chemicals gave groundwood poor color, restricted its use to low-grade printing papers (newspapers, pulp magazines, etc.). On the other hand, there is a cost advantage in using well-bleached groundwood pulp, since it doesn't have the initial wood chemical losses to the waste digester liquor (*CW, Sept. 16, p. 103*).

Modern bleaching processes have advanced groundwood pulp; it's now used in making white magazine and tissue paper. Total U.S. groundwood pulp production (3.25 million tons in '60) is typically about 13% of the total pulp produced.

Basically, groundwood is bleached

DIMENSION

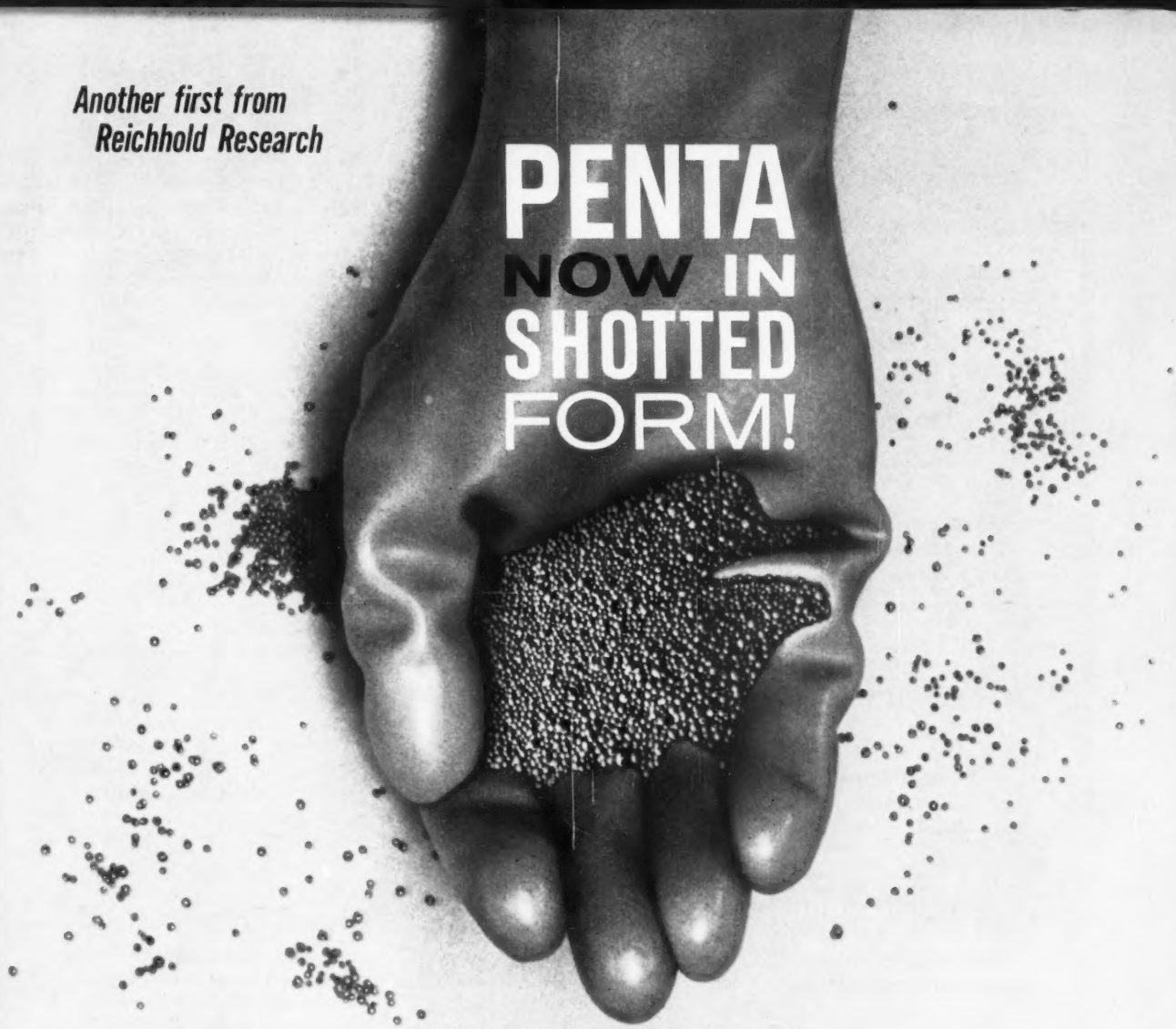
Payoff in High-Density Pulp Bleaching

The balance between additional investment versus savings on chemicals for high-density bleaching is illustrated by comparing it with moderate-density bleaching for Northeastern spruce-balsam wood. Basis: three years' operation at 300 days/year in a 100-tons/day mill.

►*Chemicals:*	*Moderate (13%) Pounds/ton*	*Density $/ton*	*High (25%) Pounds/ton*	*Density $/ton*
First stage:				
Sodium peroxide @ 21.5¢/lb.	30	6.45	25	5.38
Hydrogen peroxide @ 25.7¢/lb.	15.2	3.90	28.8	7.40
Sodium silicate @ 2¢/lb.	100	2.00	100	2.00
Second stage:				
Zinc hydrosulfite @ 21.5¢/lb.	18	3.88	no second stage	
Total Chemicals cost ($/ton)		**16.23**		**14.78**
►*Equipment:*	Total cost	$/ton	Total cost	$/ton
Dewatering section	$ 60,000	0.67	$160,000	1.78
Mixing section	16,000	0.20	16,000	.20
Retention section	145,000	1.61	145,000	1.61
Second stage	47,000	0.52	no second stage	
Total equipment cost ($/ton)		**3.00**		**3.59**
Total cost ($/ton of pulp)		**19.23**		**18.37**
Finished brightness		**78-79**		**78-79**

Another first from Reichhold Research

PENTA NOW IN SHOTTED FORM!



The effectiveness of pentachlorophenol as a wood preservative is improved by this new form, developed and produced exclusively by RCI. Shotted PENTA offers you these advantages:

- **excellent flowability**
- **virtual elimination of dusting, lumping and caking**
- **rapid dissolving**
- **reduced storage space requirements**

All this at no increase in price!

The outstanding protection RCI PENTA provides for exterior lumber is well known: it won't leach out, it's clean to handle, and it costs no more. Of great interest, however, is the growing use of the sodium salt of pentachlorophenol in bactericides, fungicides, algaecides and herbicides, where it is proving highly effective against mold and fungus growth.

RCI is a major supplier of PENTA and the **only** supplier of the new shotted form. For the name of your nearest distributor, write Reichhold Chemicals, Inc., RCI Building, White Plains, N.Y.

REICHHOLD

Creative Chemistry... Your Partner in Progress

RCI

by one of two opposite reactions: (1) reduction (with sodium bisulfite or sodium hydrosulfite), which changes the form of the color compounds but is not permanent; (2) oxidation (with hydrogen peroxide, sodium peroxide) which gives a more stable brightness and can yield a pulp with color that is almost equivalent to that produced by chemical pulping.

In general, hydrosulfite bleaching can improve brightness 6-8 points (on a General Electric brightness meter), while high-density hydrogen peroxide bleaching can improve brightness 10-18 points to a finished value of about 80.

Outside the groundwood pulp area, hydrogen peroxide bleaching is most likely to move into semichemical pulps. With neutral sulfite pulps or with cold caustic-soda pulps, it can raise the brightness from about 50 (color of manila envelopes) to about 70. And in the sulfite, kraft and other chemical pulping processes it is likely to find use as an added stage to an existing bleaching process for a super-white paper with brightness of 85.

Hydrogen peroxide's chances of capturing pulp-bleaching markets are not as good where nongroundwood pulps are concerned. Yet, if high-density hydrogen peroxide pulp bleaching can sweep the groundwood industry alone, it can capture markets for 5,000 ton/year of 50% hydrogen peroxide, about 7% of the estimated total current production.

Equipment in Japan

Chemical equipment makers in Japan are reaping the benefits of major expansions—the trend is away from fertilizers (currently about 30% of total chemical sales) toward heavy chemicals.

A CHEMICAL WEEK study shows that the five major manufacturers, Chiyoda Kako Kensetsu, Ishii Tekko, Mitsubishi Kakoki, Tanaka Kikai and Tsukishima Kikai have boosted total sales to $40.4 million in the last six months—up 20% over the previous six months.

Currently these firms have a backlog of orders totaling $70.8 million, compared with $57 million six months ago. Their average return of net profits on sales for the last six months is 6.4%. A breakdown among the individual firms shows that:

- Chiyoda Kako Kensetsu, an offshoot of Mitsubishi Oil, makes most of its sales to the Japanese oil industry. Six-month sales were $18 million; profits amounted to 5%.
- Ishii Tekko, primarily a pressure-vessel manufacturer, grossed $7 million with a 10% net profit.
- Mitsubishi Kakoki, a subsidiary of Mitsubishi Trading Co., sold general chemical plant equipment worth $6 million. Profits: 6.7%.
- Tanaka Kikai grossed $4.1 million selling equipment mostly to the Japanese sugar refining industry. Net profit: 9.8%.
- Tsukishima Kikai sold $5.3 million worth of machinery and general chemical equipment, netting 3.8% profit.

Comparison with five equipment companies picked from among the biggest U.S. industrials gives an idea of relative size. Gross income in '59 for Clark Equipment, Ingersoll-Rand, Blaw-Knox, Rockwell Manufacturing and U.S. Pipe and Foundry, combined, was $854 million; prorated to a six-months basis, this comes to $422 million, a little over 10 times that of the Japanese leaders.

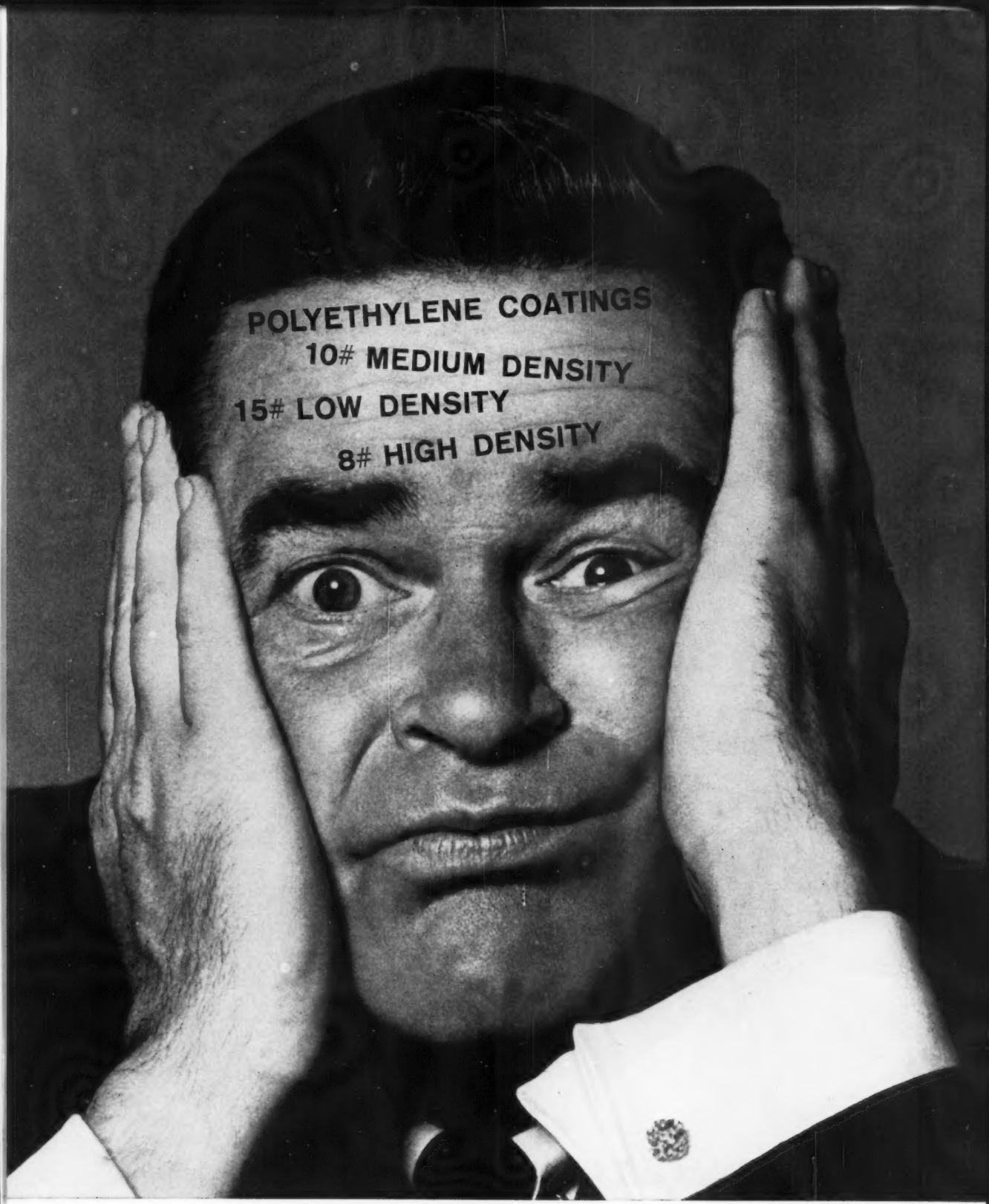
Closed Loop on Crude

A crude distillation unit incorporating a computer control system in its original design has just gone into operation at Sunray Oil Co.'s Tulsa refinery. The new unit, replacing five older units, has a capacity of 85,000 bbls./day.

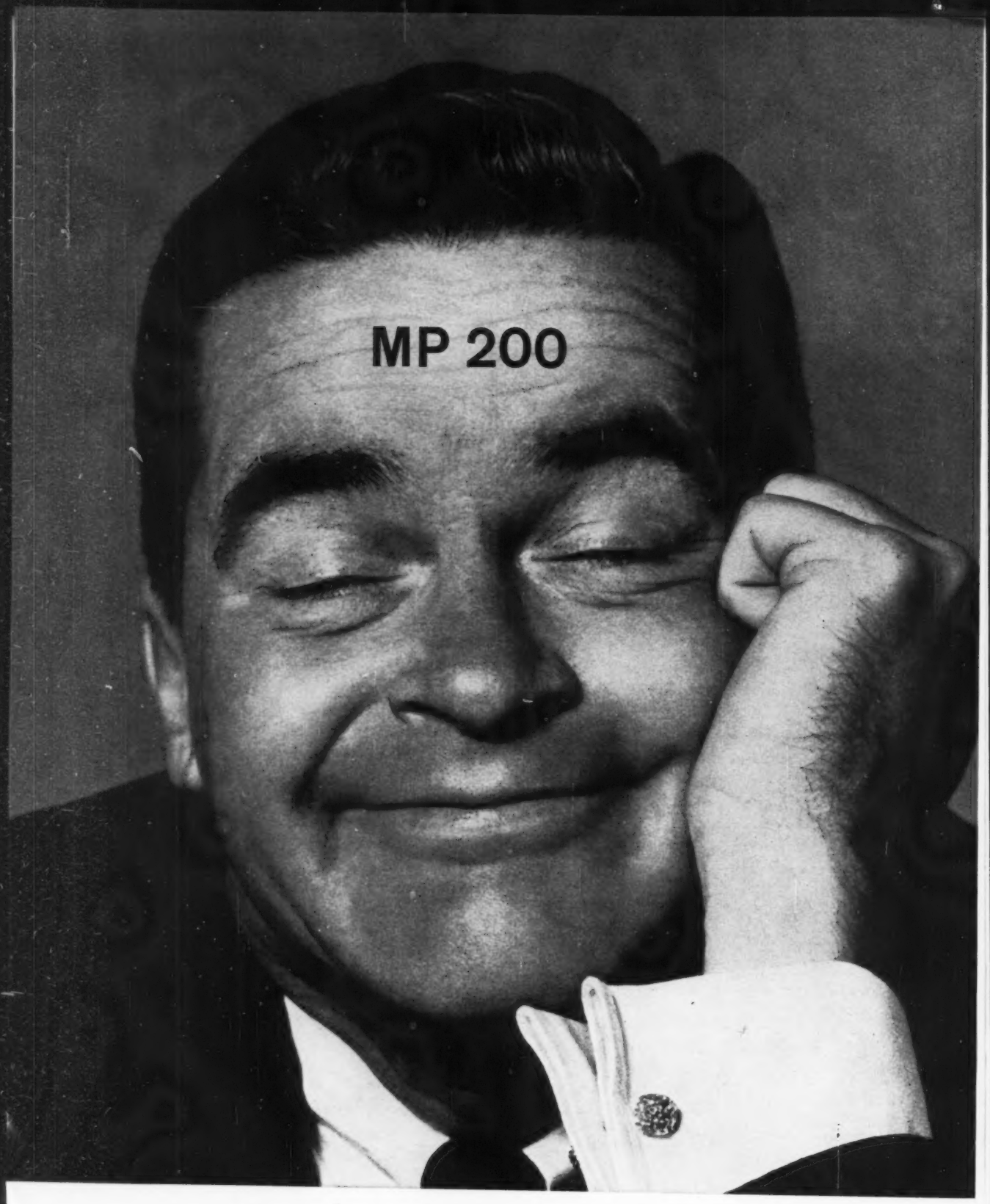
It is a three-stage distillation process separating straight-run gasoline, naphtha, kerosene, heating oils, lubricating and wax base stocks, fuel oil, asphalts and cracking stocks.

The computer control system includes a Thompson Ramo Wooldridge RW-300 computer console, two analog input cabinets, two Flexowriter units, three logging typewriters and a logging typewriter desk, along with the operator's control console and panel. It continuously scans 191 process instruments for temperature, pressure, flow, etc., and can automatically reset 30 control instruments. Comparing stored data with preset points, it also signals deviations.

Prime object is to provide more precise control for maximum efficiency. But savings in operating costs and maintenance are also expected.


POLYETHYLENE COATINGS
10# MEDIUM DENSITY
15# LOW DENSITY
8# HIGH DENSITY

Problem →



Solution →

Read how International Paper's revolutionary "MP Levels of Protection" gives you a simple yardstick to get the exact moisture vapor protection you need at the lowest possible cost.

TO MEET the demand for a simple method of specifying moisture-barrier multiwall bags, International Paper has developed its revolutionary "MP Levels of Protection."

This method cuts through the confusion resulting from the many different types of moisture-barrier paper available today. It gives you the first simple yardstick for comparing one moisture-barrier paper against another. Here's how it works.

All of our moisture-barrier papers, regardless of type of coating or weight, now have one common designation—"MP." Each "MP Level" was scientifically arrived at by determining the average range of moisture protection provided by low-density PE coated papers. Using this paper as a standard, we assigned all moisture-barrier papers to the appropriate MP Levels according to their average MVT ratings.

For example, the following chart shows the equivalent levels of protection offered by medium- and high-density polyethylene-coated papers.

As you see, a paper with 110 lbs. of low-density polyethylene coating is rated at MP level of 150. You can get this same level of moisture protection *more economically* by using a moisture-barrier paper with 6 lbs. of high-density polyethylene coating.

This means that now you don't have to be an expert on papers, coatings and weights to get the best moisture-protection for your money. Instead you specify only *the level of protection* your product requires. Or simply tell your International Paper Bagpak® representative what moisture-barrier paper is in your present bag. He can supply you with the *most economical* bag that gives you the exact level of protection required.

International Paper developed this new method to enable you to get the *exact moisture protection you need, at the lowest possible cost.* It is an example of the complete packaging service offered by International Paper.

Whatever your multiwall packaging needs, it will pay you to talk to your International Paper Bagpak packaging engineer.

EQUIVALENT LEVELS OF PROTECTION

Moisture Protection Level	MP Level Based on	GF/MVT*	Moisture-Barrier Paper Giving Equal Protection
MP-100	7.5# L.D.	2.4	5.8# M.D.
MP-150	10.0# L.D.	1.6	6.0# H.D.
MP-200	15.0# L.D.	1.1	8.0# H.D.
MP-300	20.0# L.D.	0.8	11.0# H.D.
MP-400	30.0# L.D.	0.6	15.0# H.D.

NOTE: L.D. means Low-Density Poly Coating
M.D. means Medium-Density Poly Coating
H.D. means High-Density Poly Coating
*GF/MVT—General Foods Moisture-Vapor Transmission rate is measured as grams of water per 100 sq. inches per 24 hours.

INTERNATIONAL PAPER
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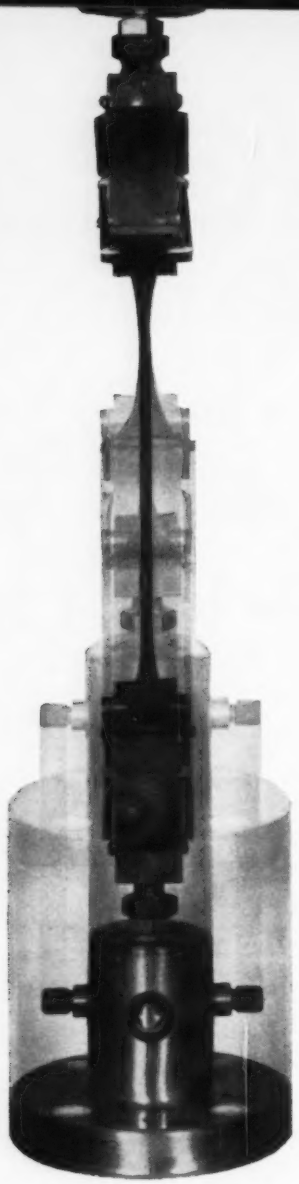


Rubber has more stretch when it's formulated with Neville C-I® Resin

Test after test on the Instron has clearly shown the superiority of quality rubber formulations using Neville Coumarone-Indene Resins in place of competing products. Compounds with Neville C-I Resin repeatedly showed better elongation and tensile strength characteristics both before and after aging.

But stretch and strength are not the only advantages gained through the use of these resins. Their unique ability to impart plasticity brings many processing benefits. Mixing, milling, calendering and tubing will be faster and smoother, and cures will be more uniform. You'll obtain improved mold flow, better knitting and a thinner flash line. Also, these resins are economically priced and will effectively lower pound volume cost in highly loaded stocks while still retaining good physicals. They are available in flaked, solid or liquid form and in a wide range of colors from ½ to 16 Neville. Softening points are from 10°C. to 155°C. Write for further information.

Neville Chemical Company, Pittsburgh 25, Pa.

NEVILLE®

Neville Products

Resins—Coumarone-Indene, Hydrocarbon (Thermoplastic and Heat Reactive), Hydroxy • **Oils**—Plasticizing, Neutral, Rubber Reclaiming, Shingle Stain • **Solvents**—Aromatic (Refined and Crude), Semi-Aromatic (Refined and Crude). • **Antioxidants**—Non Staining Rubber • **High Purity Indene • Indene Derivatives • Crude Naphthalene.**

Market Newsletter

CHEMICAL WEEK
September 23, 1961

The polystyrene price confusion was compounded early this week —not clarified as expected by divergent reactions of Dow and Monsanto to Rexall's 1¢/lb. price increase on general-purpose polystyrene (*CW Newsletter, Sept. 16*).

Dow followed Rexall's example by boosting the cost of general-purpose crystal material to 19¢/lb. Monsanto, apparently still worried about the industry's overcapacity situation, decided to stick with current prices on this grade—but threw a new twist into the price situation by upping the tab of volume color general-purpose polystyrene by 1¢, to 21¢/lb.

The policy split between Dow and Monsanto left most other producers in a quandary from which they were trying to extricate themselves as *CW* went to press. Some hinted they would follow Dow, others seemed to support Monsanto's view that a general increase wouldn't stick long enough to make the effort worthwhile. Best guess is that the polystyrene price situation will remain in flux for several more weeks as producers watch for tangible indications of buyer reactions.

•

The U.S. aluminum industry's current idle capacity of 500,000 annual tons may be obscuring an imminent aluminum boom and a possible metal shortage two years from now. That is the gist of what Walter Rice, president of Reynolds Mining, told the American Mining Congress last week at Seattle, Wash.

Rice says that aluminum shipments in first-half '61 were 4% below the same period in '60, but have since rebounded sharply, are now probably moving at a rate of more than 2.5 million tons/year. This acceleration will probably bring total '61 shipments to 2.45 million tons, 4% above the '60 level. Tentative estimate for '62 shipments: 2.9 million tons.

If unusual inflationary movements should occur in the next year or two, says Rice, customers might stockpile the metal, thereby create an aluminum shortage. Rice adds that he isn't predicting such inflationary trends, is only speculating on what might happen to aluminum markets if inflationary speedup does occur.

•

Enjay Chemical is making synthetic ethylene-propylene rubber at Baton Rouge, La. The new rubber—designated Enjay EPR—is offered for market development and commercial uses at an introductory price of 26¢/lb., f.o.b. plant, carload lots.

The rubber is made by coreacting ethylene and propylene using a Ziegler-licensed polymerization catalyst. The product is said to display

outstanding resistance to ozone, weathering and chemicals. One probable big market: the electrical industry.

Among other firms test marketing EPR rubbers: Du Pont, Hercules Powder and AviSun.

•

Startup of columbium metal concentrate production at Oka, Que., is scheduled for next month by St. Lawrence Columbium and Metals Corp., which was incorporated a year ago with an authorized capital of $5 million. The firm's completely automated $2-million mine and plant has an initial capacity of 500 tons/day, which reportedly can be easily boosted to 2,000 tons/day.

The concentrate will be sold to Samincorp of New York under an agreement reached last summer. Molybdenum Corp. and Kennecott Copper Corp. have an interest in the Oka deposit; also Nova Beaucage Mines has plans to tap the Canadian columbium deposits but has been holding off until markets for the metal improve (*CW Special Report, May 6, p. 87*).

•

Fully deuterated benzene (C_6D_6) is available in development quantities "at a fraction of former prices" from Ciba Ltd. (Basel, Switzerland). Price of 99% C_6D_6 is $700 kg.

•

Large quantities of 99.7% pure methane are available. Gulf Coast Minerals Management Corp. (Corpus Christi, Tex.) isn't having much luck finding a taker for the high-purity methane available from its well at an estimated potential open flow of 16.2 million cu. ft./day.

Only bulk user of high-purity methane reportedly is Phillips Petroleum—but Phillips has its own assured source from a well near Uvalde, Tex.

•

What's behind lithium hydroxide price cuts? Producers slashed monohydrate tabs 5¢/lb. to 54¢/lb. in carlots and 58¢/lb. l.c.l., delivered.

Right down the line, producers hedge on giving out the full story, but hint about sales deals—some say it involved a "grease manufacturer in the New York area," some say it was a "major new oil company account," others insist two firms are involved—in competitive bidding for lithium hydroxide.

At any rate, Foote Mineral initiated the price cut but probably did not win the contract; other producers followed with similar cuts.

Meanwhile, Quebec Lithium (Montreal) revealed it hopes to have a new lithium hydroxide monohydrate plant operating by December.

What's News in Enjay Chemicals...

firsts

ISOPROPYL ALCOHOL
ISOOCTYL ALCOHOL
DECYL ALCOHOL
TRIDECYL ALCOHOL

NOW HEXYL ALCOHOL

Since introducing isopropyl alcohol in the early "twenties," Enjay has pioneered in the development and production of many advanced chemical raw materials for industry.

In the field of alcohols, hexyl alcohol is the latest in a long line of Enjay "firsts" designed to meet the changing requirements of our customers. This new oxo alcohol is offered for quick, dependable delivery from conveniently located supply points.

Next time you need alcohols or other chemical raw materials, be sure to call on Enjay. For more information, write to Enjay at 15 West 51st Street, New York 19, N. Y.

SPECIFICATIONS OF ENJAY HEXYL ALCOHOL

Purity (wt per cent) min.	98.0
Specific Gravity (20/20°C) min	0.819
Specific Gravity (20/20°C) max	0.821
Acidity, as acetic acid (wt per cent) max.	0.001
Color (Pt-Co) max	10
Water (wt per cent) max.	0.10
Carbonyl Number (mg KOH/g) max.	0.2
Distillation (°C)	
Initial min	149
Dry Point max.	156
Appearance: Clear and Free of Suspended Matter	

EXCITING NEW PRODUCTS THROUGH PETRO-CHEMISTRY

ENJAY CHEMICAL COMPANY

A DIVISION OF HUMBLE OIL & REFINING COMPANY

ENJAY

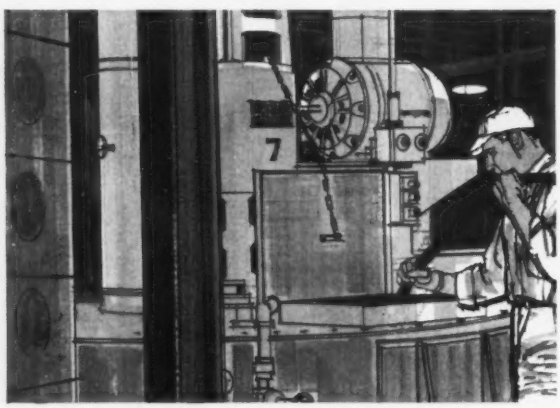
ARMOUR IDEA CHEMICALS

Chemical Intermediates

Many of Armour's aliphatic organic chemicals have numerous applications when used *per se*—but the various functional groups present in certain of these compounds allow modification of the molecule to produce other compounds with more valuable properties for new applications. The high molecular weight normal alkyl groups present in the chemical intermediates may impart desirable characteristics such as surface activity and oil solubility to the new compound. Functional groups available for modification are present in our acids, nitriles, amines, ketones and amides. Result: from the broad range of Armour chemical intermediates, a wide variety of end products for numerous uses. For example:

KETONES—REACTION PRODUCTS FOR PLASTICS, LUBE OILS, LACQUERS

Armour Armone® compounds—methyl unsymmetrical alkyl ketones—offer interesting potential as chemical intermediates. The combination of long and short alkyl radicals imparts excellent solubility characteristics to Armones, influences their reaction rates, and maintains the low-volatility characteristics necessary for many applications. Armones may also be used as intermediates in perfume manufacture... additives for plastics and lube oils...mutual solvents in lacquers and varnishes... ingredients in resin formulations and rubber recipes. From these chemicals compounds such as carbinols, amines and alkanes may be formed.



ALPHA-SULFOS—NEW AIDS TO DETERGENT MANUFACTURE, GLASS PRODUCTION, GREASE PREPARATION

Recent research has uncovered the versatility of Armour's Armosul* compounds: alpha-sulfonated palmitic acid, Armosul 16...and alpha-sulfonated stearic acid, Armosul 18. Since they are sulfonated products, the Armosuls are completely stable to acids and alkalies. With these difunctional acids, mono-, di- and mixed salts are easily prepared. The salts are suggested for improvement of detergent formulations...and to aid in production of synthetic detergent bars. As flotation reagents, the Armosuls remove mineral impurities from silica sand to assure quality glass products. Reports also indicate their usefulness in the preparation of high dropping-point greases. With Armosuls, it is easy to form water-soluble esters with anionic surface active properties. These esters are quite stable to hydrolysis, suggesting uses as surfactants in acid dyeing, pickling and electroplating.

**Armour & Co. trade-mark*

Armour Industrial Chemical Company

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TERTIARY AMINES—A SHORT CUT TO CHEMICALS FOR SANITATION

Quaternary ammonium salts can now be produced more economically with Armour tertiary amines. These Armeen® compounds are ideal raw materials for producing algaecides for swimming pools, germicides, bacteriostats, emulsifying agents, even dye-leveling aids for textile processing. Tertiary amines can be converted directly to quaternaries without intermediate steps, and Armour's amines offer the most efficient approach to quat manufacturing. Tertiary amines also form amine salts with both organic and inorganic acids to produce a series of oil-soluble or water-soluble chemicals with surface active properties. These same properties give tertiary amines, when added to lubricating oils, the ability to neutralize acids —therefore acting as acid scavengers.

IN YOUR OPERATION, TOO!

Armour chemical intermediates can help you produce useful end products. Call the man who knows—your Armour representative. He knows his way around the lab...is familiar with even the most unusual applications of chemical intermediates. For further information, send the coupon.

PRIMARY AMINES—INTERMEDIATES FOR THE PREPARATION OF OIL-SOLUBLE HERBICIDE FORMULATIONS

Hormone acid type herbicides such as 2,4-D and 2,4,5-T are usually applied in emulsion form. However, since these materials are not soluble in oil, they are often reacted with alkyl amines to yield an oil-soluble product. Newest and best of the amines for the purpose are the Armeens. The Armeens provide herbicides with lower volatility and lower water solubility than those prepared with short-chain amines. Armeen-derived herbicides dissolve easily in oil, adhere better to weed surfaces, and will not vaporize and spread to nearby plants.

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Please send me:

- ☐ Technical bulletin on Armones (No. G-12R1)
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- ☐ Armeen booklet

..... (Samples)

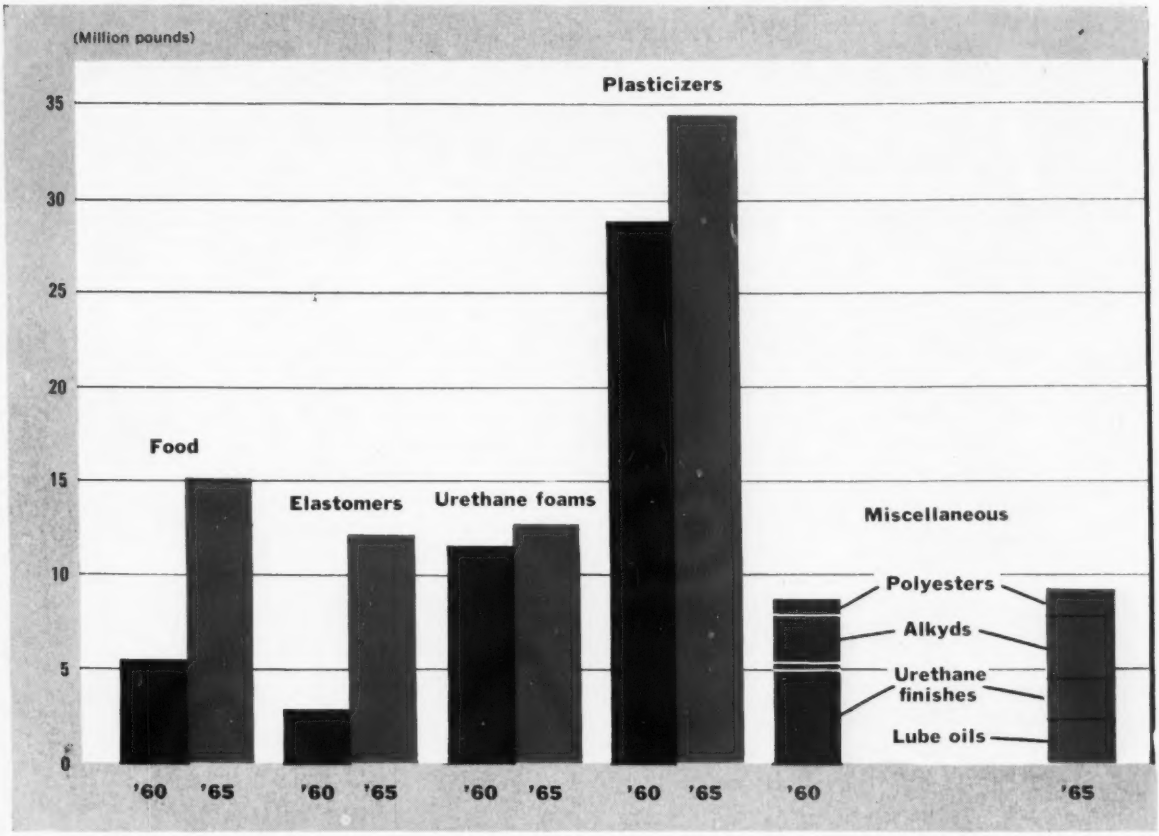
Name.....Title.....

Company.....

Address.....

City.....Zone....State.....

Non-Nylon Adipic Acid Demand—Up 40% by '65?



Adipic Loosens its Nylon Ties

Although nylon is the thread that pulls the adipic acid business together, uses of the acid other than for nylon are showing strength. One reason: attractive pricing. Du Pont's 10% price cut early this month (CW Market Newsletter, Sept. 9) dropped tabs to 29¢/lb., and other producers quickly matched it. Now estimates are that by '65 close to 80 million lbs./year of adipic will be used as a chemical intermediate.

Prime force behind the new-market drive is the four adipic acid producers' capacity situation—Du Pont (200 million lbs./year), Chemstrand (210 million lbs./year), Monsanto (30 million lbs./year), Allied Chemical (about 20 million lbs./year)—a total of more capacity (460 million lbs./year) than nylon can utilize alone. Probably 90-95% of Du Pont's and all of Chemstrand's output is used captively to make nylon; that leaves Allied, Monsanto and Du Pont selling adipic acid on the open market. An additional 20 million lbs./year coming from Rohm & Haas (*CW, Aug. 5, p. 83*) will bring the total capacity for non-nylon use to about 80-90 million lbs./year, well above the current demand.

Growth Curve: The balancing factor has been the fast growth of adipic in non-nylon applications. The U.S. Tariff Commission reports sales of 40.3 million lbs. of the acid in '60—and to this could be added 10-15 million lbs. retained by Du Pont, Allied and Monsanto to manufacture various types of polyesters, laminating resins, urethane foam and elastomers. The total, 50-55 million lbs., is a sizable increase from the 21.6 million lbs. so used in '56 and 24.3 million lbs. in '58.

And the strong new marketing pitch, plus new applications in several fields, makes a doubling of adipic acid sales in the next five years not difficult to visualize. Plasticizers have taken the lion's share of the acid, and this market will continue to grow enough to keep it on top. But the most striking growth in adipic acid consumption will stem not from plasticizers but rather from food, elastomers and urethane foams. These three applications now take about 20 million lbs., but by '65 will take 40 million lbs.—a total well above the estimated plasticizer demand of 34.5 million lbs.

Food Eats It Up: The food industry consumes 4-7 million lbs./year of adipic acid (approved by the Food &

MARKETS

Drug Administration for use in food). This is rather small, compared with citric acid usage, now at the rate of 55-60 million lbs./year. Reason: citric has better solubility, availability and has been cheaper. But adipic tagged at 29¢/lb. (citric acid: 29½¢/lb.) can now compete with citric economically. Adipic's poor cold-water solubility may have been hurdled by a recent patent (U.S. 2,982,653) issued to General Foods Corp. (White Plains, N.Y.). GF claims that the rate of cold-water solubility of adipic acid is improved if it is first slurried with a salt (e.g., sodium or ammonium chloride) and then dried. This opens the door for use of adipic in cold drinks and other products where it formerly couldn't compete with citric.

Fumaric acid is the other noteworthy contender for the food acidulation field (*CW, Aug. 26, p. 63*). Although it is cheaper (27¾¢/lb.) than either citric or adipic, it still has only temporary approval by FDA for food use.

Adipic acid has some advantages over citric in food uses—e.g., it is nonhygroscopic and therefore noncaking; some food producers claim that adipic supplies a better taste, gives better gel structure to desserts. Its use will probably rise to 10-20 million lbs./year by '65.

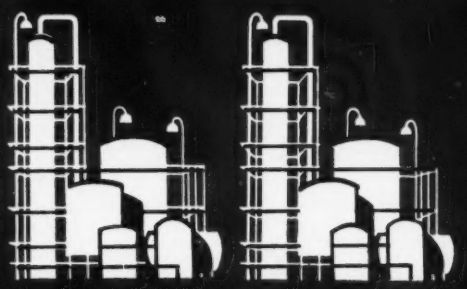
Urethane Elastomers: Government statistics presented urethane elastomers separately for the first time in '59. Output: at 2.3 million lbs. Production in '60: 7.8 million lbs. This use required about 900,000 and 2.7 million lbs. of adipic acid in '59 and '60, respectively.

Normal growth in this area by '65 will likely result in demand of 12 million lbs. But, as pointed out recently (*CW, June 3, p. 79*), new roles for adipic in cable jacketing, tires, fibers, etc., could mushroom demand to 60-80 million lbs. by '65.

Plasticizers Healthy: Most adipic has gone into manufacture of plasticizers—28-30 million lbs. in '60. The adipates impart low-temperature flexibility to vinyl film and low viscosity to vinyl plastisols.

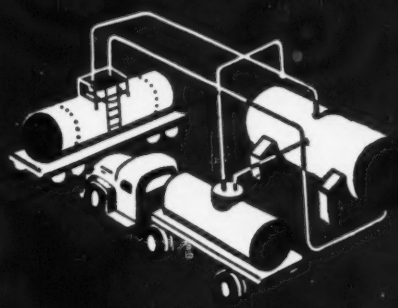
Adipates used in previous years have been the less-costly octyl and decyl esters. They are quite volatile, however, and to overcome this, adipic acid is being combined with glycols to form polymeric plasticizers, which do not volatilize, do not migrate in con-

Service and experience make Rohm & Haas your best source for methylamines



Availability from 2 plant locations

Long experience in production and use



Aid in designing bulk handling and storage facilities

Detailed technical literature

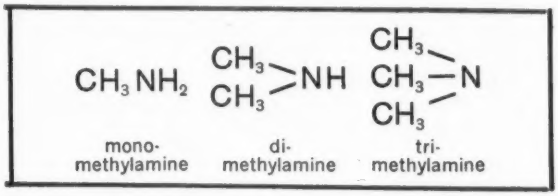
You get these benefits when you buy methylamines from Rohm & Haas:

(1) Two plants at separate locations assure you dependable supply of methylamines . . . anhydrous or aqueous form—in tankcars, tanktrucks, drums, and 5-, 25-, 100-, and 590-pound cylinders.

(2) You buy from a source with broad production experience. Rohm & Haas began selling methylamines in pilot-plant quantities in 1930; started commercial production in 1934.

(3) Technical service representatives are available to assist you in designing unloading, storage, and handling facilities.

(4) Rohm & Haas offers three booklets with valuable information for technical men doing laboratory, development, or production work: *Methylamine Chemistry and Uses, Storage and Handling, Properties and Analytical Methods.* Write to Dept. SP-9 for your free copies. Methylamine samples are also available upon request.



ROHM & HAAS

PHILADELPHIA 5, PA.

METHYLAMINES

tact with lacquers and are not leached out of films by solvents, oils or soapy water.

An estimated 70% of the adipate plasticizers now used are of this polymeric type. Growth in this area will depend primarily on growth of the vinyl market, will require 33-36 million lbs. of adipic by '65.

More Bounce: The manufacture of adipic polyesters for urethane foams took 8.5-12.5 million lbs. of adipic acid in '60. Polyethers are far more widely used because they are cheaper than polyester foams. Polyesters may take 10-15 million lbs. of adipic acid by '65.

In addition, miscellaneous applications such as laminating resins, lube oils, polyesters alkyds and urethane finishes consumed about 8.8 million lbs. of adipic acid in '60. But only slight growth is projected during the next five years.

Outlook: Consumption of adipic acid will show a healthy increase, and the supply/demand balance looks good for '65. But possibilities of wider use in new products (e.g., urethane tires) or an increase in nylon production could change the supply picture radically.

Focus on Electronics

Last week at the Chemical Market Research Assn.'s meeting at the Sagamore Hotel in Lake George, N.Y., attention was focused on chemicals' opportunities in the electrical and electronic industries.

Warren Shew, publisher of *Electrical World*, chided chemical producers for not taking fuller advantage of such markets. He said: "Despite the obvious need and clear-cut opportunity, the chemical industry seems to have taken the view that the electrical industry volume is too small to warrant any appreciable expenditure of either treasure or talent."

Shew and other speakers highlighted several areas in which chemical market potential exists: new structural materials for electrical equipment; magnetic materials for computer, communications and entertainment applications; insulating materials; solid-state devices materials; thermoelectric conversion: high vacuum; cryogenics; electrical appliances; new and unconventional sources of power.

AMOCO CHEMICALS

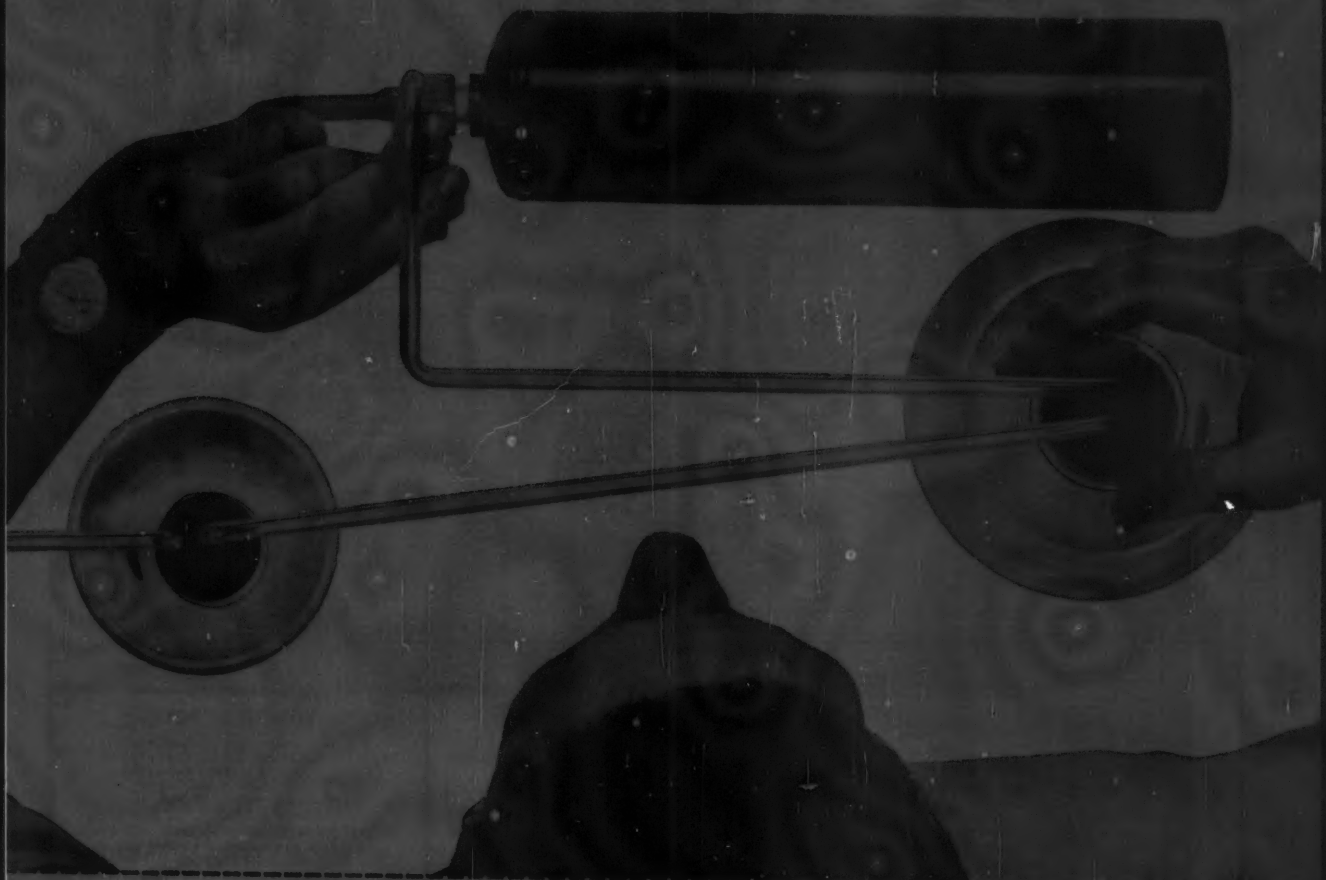
Does Methyl Mercaptan set your imagination working?

Methyl Mercaptan (CH_3SH) is a high purity material (98.0% minimum). Its methyl thio ether linkage provides it with interesting possibilities in the manufacture of insecticides, plastics and other organics. It is useful in some reactions as a catalyst. Many of its reactions are similar to those of methyl alcohol.

Methyl Mercaptan is a highly volatile, colorless liquid with a low boiling point (6.5° C.). It is slightly soluble in water and very soluble in alcohols, ethers and petroleum naphthas.

An important consideration is the immediate availability of Methyl Mercaptan in multi-million pound quantities.

Send for Amoco Chemicals Bulletin M-1 or write on your letterhead for a sample. Your request will receive immediate attention.



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Department 4595
130 East Randolph Drive • Chicago 1, Illinois

Please send me ☐ Bulletin M-1
☐ Price & Shipping Information
Possible Application_____
Name_____
Position_____
Company_____
Address_____

30 alkalies to choose from

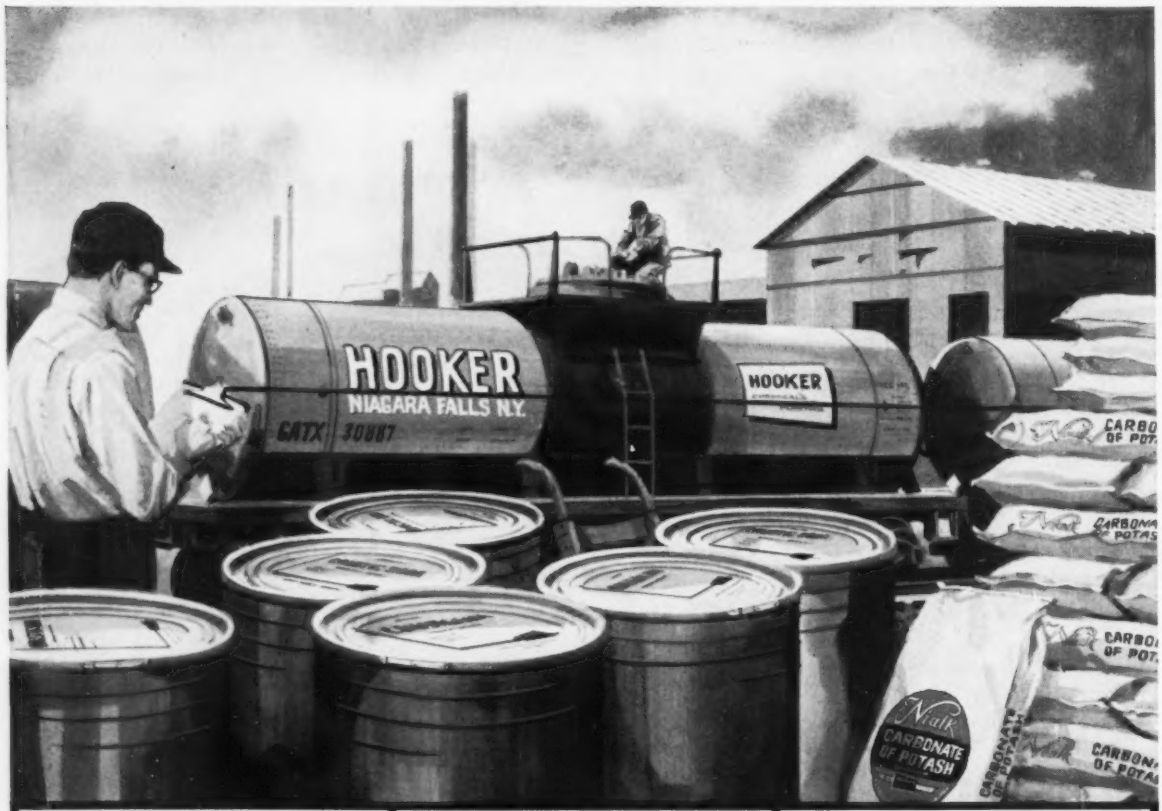
This kind of variety is more than sheer spice. It represents higher profits, because you can purchase almost any form and grade of alkali you need. It follows that processing and repackaging costs go down.

You save on purchasing costs too, because two or more of these consistently uniform alkalies can be ordered *together* in mixed carloads or mixed truckloads. One order, one billing, one responsibility—cuts buying and bookkeeping red tape.

NEW CAUSTIC SODA DRUMS • You don't need a tool kit to open Hooker's new flake caustic soda drums. They flip open, empty easier . . . because the drums have *full* open heads—21 inches across.

The wider mouth also makes the drums more adaptable to re-use.

The next time you're considering alkali requirements, call in our representative who is trained in the economics of these alkalies. Some of his ideas can work to your advantage.



HOOKER CAUSTIC SODA

Liquid 50%
Rayon grade liquid 50%
Liquid 73%
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Solid
Regular Flake
Crystal Flake
Fine Flake
Phosphated
Special Alkali

Liquid forms available in tank cars and tank trucks, dry forms in drums.

CAUSTIC POTASH

Standard Grades
Liquid 45-52%
Solid 90% and 85%
Flake 90% and 85%
Granular, Walnut, Broken, Powder and Crushed—all 90%

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Hydrate, Regular 83.5-84.0%
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Liquid form available in tank cars and tank trucks, dry forms in wooden barrels, fiber kegs, and paper bags.

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HOOKER CHEMICALS PLASTICS

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Sales offices: Buffalo, Chicago, Detroit, Los Angeles, New York, Niagara Falls, Philadelphia, Tacoma, Worcester, Mass. *In Canada:* Hooker Chemicals Limited, North Vancouver, B.C.

Spraying insecticide: Makers must move fast to get share of market.

Quick Sell Wins Bug Market

This month Shell Chemical's Vapona insecticide (dimethyldichlorovinyl phosphate) received U.S. Dept. of Agriculture clearance for use, moving it one big step closer to major marketing opportunities. The approval now allows farmers and other customers to apply the insecticide themselves as a wet spray or fogging solution with conventional equipment. Heretofore, the chemical could be applied only by professional pest-control operators.

Upshot: the Shell insecticide is now a vigorous competitor for a hefty piece of the estimated $130-million/year insecticide market (*CW, July 22, p. 95*). If it follows the classic pattern of its predecessors, it will rapidly advance to peak selling powers, remain there for two or three years, then suffer sagging demand as bugs develop a resistance to it and new products come along.

A couple of cases in point: methyl parathion's U.S. production rose from 1.9 million lbs. in '57 to an estimated 12 million lbs. in '61; but going the other way is calcium arsenate, with output down from 27.1 million lbs. in '56 to 6.4 million in '59.

Taking best advantage of insecticides' short life—with selling time reduced even further by only short seasons in each year—requires carefully planned marketing. This must be done largely while the new product is still getting broader labeling permission from USDA and the Food & Drug Administration. Simultaneously, the company carries on other testing work, to determine how many bug menaces the product is effective against, endeavors to get this information to farmers, agricultural experimental stations, county agents and other buying influences as soon as it is available. Also important: establishing the brand-name early.

Much of this work must be done during a selling season approximately six months long (September is the last big month of insecticide sales in the U.S.). Some of the industry's seasonal nature is now leveling out, however, due to the increasing importance of export sales, particularly to the Southern Hemisphere, where seasons are the opposite.

Who Says? Since there are several hundred different insecticides now on the market, each with varying degrees of effectiveness on an even greater variety of insects, growers are easily confused, will listen to the advice of anyone they respect. Generally, for example, they follow their dealer's recommendation — although dealers are sometimes ill-informed on the subject (insecticides form only a small percentage of the average farm dealer's over-all sales). Beyond this, growers read articles and advertisements in farm magazines, listen to the county agricultural agent, follow recommendations sent out by the state colleges and experimental stations.

The two most important methods used in reaching these important buying influences are direct contact and publication of articles in authoritative agricultural journals by impartial experts, usually someone connected with a college or with the state or federal government—few journals would publish such articles not so authored. A large part of the promotional effort, therefore, is directed toward working with authors, getting resultant articles published.

Insecticide makers generally find that it doesn't pay to put much effort into advertising specific products nationally — insecticide problems vary too much from one locality to another. More favored are regional farm publications, local radio stations, local billboards, and direct mail—particularly when a pestilence, against which a company's product is especially effective, strikes a community. State and county fairs are considered too numerous, consequently too expensive, to use more than occasionally.

Mixing It Up: For an additional localizing influence, producers mix together two or three insecticides to kill as many varieties of pest in one pass, or mix in a fungicide or other chemical. It is frequently difficult to know which combinations are best, particularly since it is necessary to consider chemical content of local water, possible changes in composition of companion products made by other manufacturers.

Companies frequently mix their product lines as well. Reason: in an effort to build a line that will cope with all insect problems in areas where they have strong marketing setups, producers buy products from other manufacturers, resell them either in formulation or out. No one company has the research organization that's necessary to offer such a line on its own. As a result, it could lose out in some areas when local problems aren't met by any of its products. This could seriously jeopardize a company's dealership arrangements. Because the short life span of a product

makes it uneconomical to promote more than one name for it (in fact, it would be virtually impossible to get descriptive information across to all the country's farmers in such a short time), resellers stick with a product's original name. For the same reason, although USDA regulations require each new insecticide to have a generic as well as a tradename, many do not have both.

To Whom: Insecticides are generally sold to distributors and dealers or directly to consumers (large commercial farms, which frequently employ their own entomologist, are sometimes wary of the technical competence of middlemen).

Custom-application firms—both aerial and ground applicators—are frequently a selling influence, sometimes act as dealers. Many offer a regular inspection and spraying service on an annual fixed-fee basis. In such arrangements the farmer pays extra for the insecticide on a cost-plus arrangement. Most insecticide producers make little extra effort to reach custom applicators, assume they are exposed to the same magazines and other influences as their farmer customers.

Since a sale can't be made unless the insecticide is waiting near the farms at the instant the farmer wants to buy, and since dealers (fearing overstocking) often would not have ample supplies, some kind of dealer protection plan is usually arranged. Consignment, as a way to solve this problem, is not as prevalent as it once was, and manufacturers are now turning toward such devices as late billing and partial call-back.

Market forecasting is not much help on that score; generally it can be done only on a three- to five-year basis, allowing for wide fluctuations caused by weather, insect birth rate, etc., from season to season within the forecast period. Nevertheless, each manufacturer feels that it is necessary to have available every season enough inventory to cope with the biggest possible market.

Over the long haul the market is certain to increase steadily as smaller, less scientific farmers sell out to large, businessmen operators.

But the year-to-year fluctuations of the insecticide market will still be much more troublesome for an individual company than for the industry as a whole: the specific bug a company's product is equipped to cope with may not be a menace next year. The firm must rely, week-to-week, on reports from dealers and agents in the field to know where to rush shipments, take maximum advantage of the marketing feature its product offers. To the average insecticide maker, the only good bug is one that his product will kill.

Bridge for Trade

Chemical trade between Britain and continental Europe—due to become more important if the United Kingdom actively joins the European Common Market—could speed up considerably as a result of an English Channel bridge, now under serious consideration by a joint English-French study group.

The bridge—posed as an alternative to the long-talked-about channel tunnel—was initially proposed last month by the French Société d'Etude du Pont sur la Manche, headed by Jules Moch, France's permanent representative to the United Nations Disarmament Commission, and backed by French construction firms, banks and trade associations. Plans were prepared by France's top bridgebuilder, Compagnie Francaise d'Entreprises, with the help of Britain's Dorman Long and the U.S.'s Merritt-Chapman & Scott Corp.

Blueprints call for steel construction 20.5 miles long and about 118 ft. wide. Some 164 concrete piles will hold the bridge 230 ft. above sea level, enough to give clearance to the largest ships. Cost: $616 million.

All told, five traffic lanes could carry about 6,000 vehicles/hour, and there would still be room for a railway line in each direction. And if congestion threatened, a platform that would double this capacity could be put up when needed.

It is now expected that the average toll would be about $18. Based on this total cost, the planners believe, the bridge would be an attractive investment.

Already, groups in the U.S., Germany, Switzerland, Italy and the Benelux countries have offered financing. French officials have asked the British to set up a group similar to their own to push the project. One will probably be organized in London soon.

DATA DIGEST

- **Polystyrene:** Booklet describes a polystyrene cation exchanger, Ionac C-240, for industrial and home water treatment. Prime uses: water softening, demineralization, treatment of water with wide pH and temperature range. Also included are tables of chemical properties and operating characteristics, Ionac Chemical Corp. (Birmingham, N.J.).
- **Anhydride:** New, revised technical bulletin on tetrahydrophthalic anhydride gives physical and chemical properties, toxicity, handling precautions and uses. Anhyride's applications range from plasticizers to insect repellants, lubricant additives and pharmaceuticals. National Aniline Division, Allied Chemical Co. (40 Rector St., New York 6).
- **Nutrients:** Catalog describes fermentation nutrients — low-cost autolyzed yeast fractions and enzyme hydrolyzed proteins — now available in commercial quantities. Also listed are chemical analyses and prices. Amber Laboratories, Inc. (3456 North Buffum St., Milwaukee 12, Wis.).
- **Polyvinyl Chloride:** Booklet details company's rigid polyvinyl chloride products, gives data on physical properties, chemical resistance and design and fabrication. Special section outlines case histories of various applications. Kaykor Products Corp. (Yardville, N.J.).
- **Molding Compounds:** Brochure lists molding methods, mold design, applications and typical procedures for the company's epoxy molding compounds. American-Marietta Co. (3400 13 Ave. Southwest, Seattle 4, Wash.).
- **Thickening Agents:** Technical information sheet details the use of thickening and stabilizing agents Attagel 20 and Attagel 30. Included are descriptions of typical properties, applications, viscosity curves showing behavior in water, and several formulating examples. Minerals & Chemicals Philipp Corp. (Menlo Park, N.J.).
- **Butyl Alcohol:** Booklet contains specifications, resin solubilities and a section on physical properties of n-butyl alcohol. Also included: an extensive list of binary and ternary azeotropes. U.S. Industrial Chemicals Co., division of National Distillers and Chemical Corp. (99 Park Ave., New York 16).

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Tracers

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European Chemical Co. has need for a consultant in: Rubber Chemicals. We demand manufacturing —selling and application know-how etc. Contact: Havas no. 217/598, Rue Vivienne 17, Paris.

European Chemical Co. has need for a consultant: Polyamide Molding Compounds. We demand process improvement, new processes, application know-how, etc. Contact: Havas no. 260/-598 rue Vivienne 17, Paris (France).

Chemical Engineer or Chemist—Small rapidly developing company requires young technically trained man to head quality control & development program. Position offers stability of basic chemical industry with advancement opportunities of a new organization. Contact P-7510, Chemical Week.

POSITIONS WANTED

European Technical Representation participation offered-See ad August 26th.

Mechanical Engineer, age 33, over 14 years diversified experience in foreign and domestic petroleum refineries, last 4½ years in responsible management positions. Available now to relocate anywhere U.S. For complete resume write: 607 East Cherry St., Robinson, Illinois.

EMPLOYMENT

Your Organization-is it complete? Are you expanding it? Making replacements? Naturally, you are anxious to secure the most suitable man or men available. You want men with the special training that will make them an asset to your organization. You can contact such men through an advertisement in this Tracers Section of Chemical Week. Classified Advertising Division, Chemical Week, Post Office Box 12, New York 36, New York.

OPPORTUNITIES

Opportunities-business; personal or personnel; financial; equipment; etc., may be offered or located through the Tracers Section of Chemical Week. For more information write to: Classified Advertising Division, Chemical Week, Post Office Box 12, New York 36, New York.

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The Consulting Engineer. "By reason of special training, wide experience and tested ability, coupled with professional integrity the consulting engineer brings to his client detached engineering and economic advice that rises above local limitations and encompasses the availability of all modern developments in the fields where he practices as an expert. His services, which do not replace but supplement and broaden those of regularly employed personnel, are justified on the ground that he saves his client more than he costs him."

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Multi-million dollar chemical plant at North Little Rock, Ark. Stainless Steel & glass-lined equip. Send for detailed circular. Perry, 1415 N. 6th St., Phila. 22, Pa.

Pfaudler 1250 gal. blue-grass lined jacketed reactor, 72" x 72", Agit. Perry, 1415 N. 6th St., Phila. 22, Pa.

6' x 120' rotary kiln, ⅝" welded shell, excellent shape. Perry, 1415 N. 6th St., Phila. 22, Pa.

Buflovak 42" x 120" double drum dryer, ASME 160 psi, Complete. Perry, 1415 N. 6th St., Phila. 22, Pa.

Stainless Steel Valves, Powell 304 gate, flanged. ½" to 3". Clean. Priced right. Industry Associates, 301 York Road, Jenkintown, Pa.

CHEMICALS WANTED

Surplus Wanted—Chemicals, Pharmaceuticals Oils, Acids, Plasticizers, Resins, Dyes, Solvents, Pigments, Etc. Chemical Service Corporation, 96-02 Beaver Street, New York 5, N.Y. HAnover 2-6970.

WANTED/FOR SALE

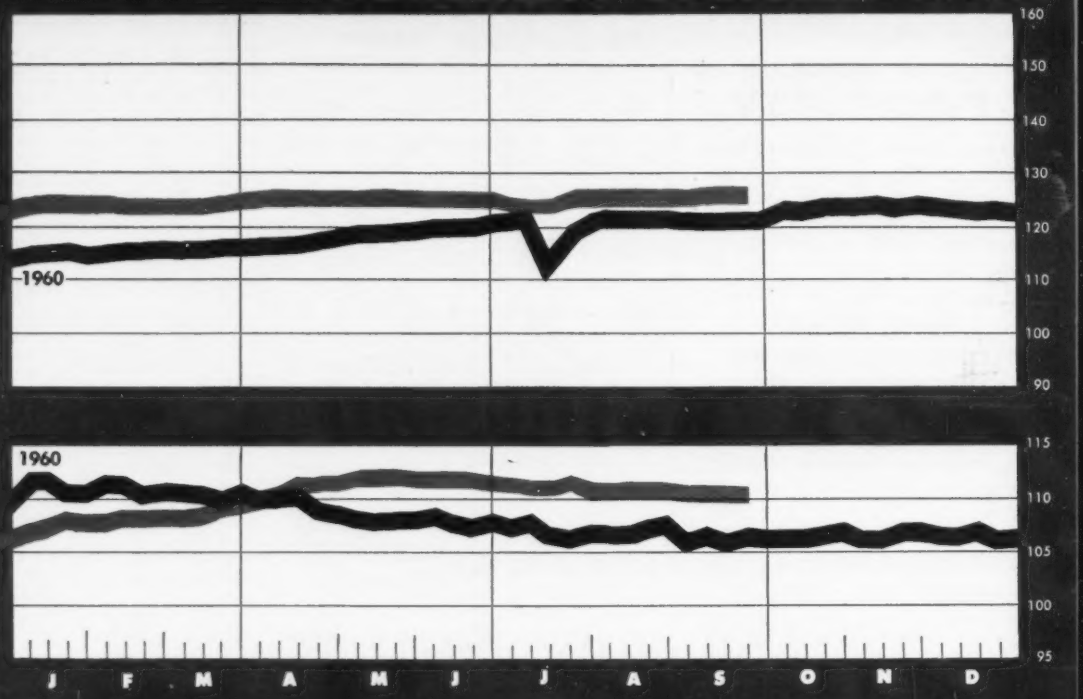
This Tracer Section can be used whenever you are looking for or offering Equipment, Plants, Supplies, Chemicals, Opportunities, Special Services. The rates are low—just call or write Classified Advertising Division, Chemical Week, P.O. Box 12, N.Y. 36, N.Y. LOngacre 4-3000.

MISCELLANEOUS

To Employers Who Advertise for Men: The letters you receive in answer to your advertisements are submitted by each of the applicants with the hope of securing the position offered. When there are many applicants it frequently happens that the only letters acknowledged are those of promising candidates. (Others do not receive the slightest indication that their letters have even been received, much less given any consideration.) These men often become discouraged, will not respond to future advertisements and sometimes even question if they are bona fide. We can guarantee that Every Advertisement Printed Is Duly Authorized. Now won't you help keep our readers interested in this advertising by acknowledging every application received, even if you only return the letters of unsuccessful applicants to them marked say, "Position filled, thank you." If you don't care to reveal your identity, mail them in plain envelopes. We suggest this in a spirit of helpful co-operation between employers and the men replying to Positions Vacant advertisements. Classified Advertising Division, McGraw-Hill Publishing Company. "Put Yourself in the Place of the Other Fellow."

Chemical Week

BUSINESS BENCHMARKS

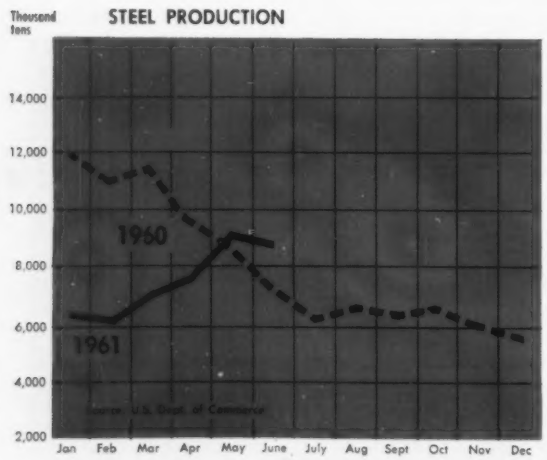


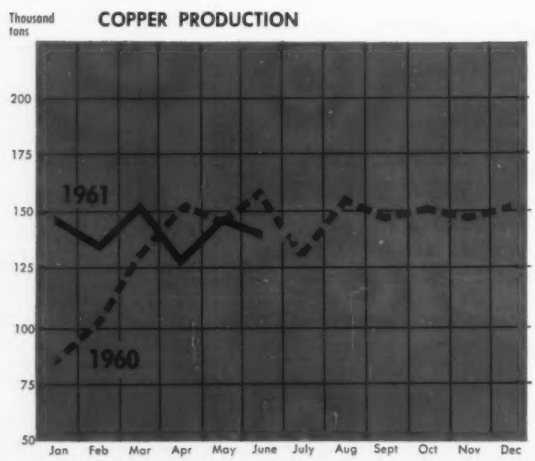
SEPTEMBER 23, 1961

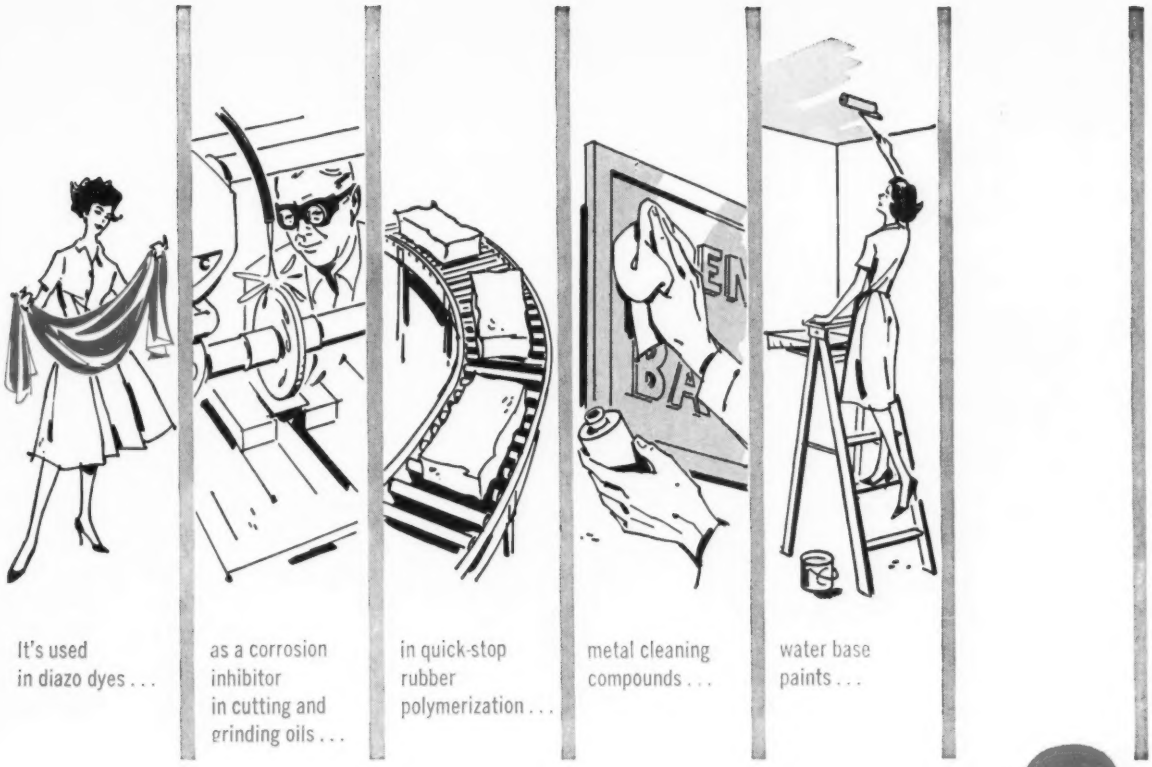
WEEKLY BUSINESS INDICATORS	Latest Week	Preceding Week	Year Ago
Chemical Week output index (1957=100)	126.0	125.9	122.2
Chemical Week wholesale price index (1947=100)	110.5	110.4	106.9
Stock price index (12 firms, Standard & Poor's)	55.55	55.85	47.06
Steel ingot output (thousand tons)	2,032	2,030	1,401
Electric power (million kilowatt-hours)	15,838	16,214	14,615
Crude oil and condensate (daily av., thousand bbls.)	7,162	7,051	6,874

TRADE INDICATORS (million dollars)	MANUFACTURERS' SALES			MANUFACTURERS' INVENTORIES		
	Latest Month	Preceding Month	Year Ago	Latest Month	Preceding Month	Year Ago
All Manufacturing	31.08	30.90	30.44	53.58	53.36	54.70
Chemicals and Allied Products	2.50	2.51	2.30	4.24	4.24	4.14
Petroleum and Coal Products	3.27	3.22	3.19	3.38	3.37	3.29
Paper and Allied Products	1.17	1.18	1.08	1.66	1.67	1.61
Textile Products	1.23	1.27	1.23	2.75	2.75	2.69

CHEMICAL CUSTOMERS CLOSE-UP







It's used in diazo dyes . . . | as a corrosion inhibitor in cutting and grinding oils . . . | in quick-stop rubber polymerization . . . | metal cleaning compounds . . . | water base paints . . .

How can you use KNO_2?

Have you evaluated B&A® Potassium Nitrite for *your* process? Study of its physical and chemical properties may point to this high-purity chemical as just the material you need!

B&A Potassium Nitrite is available in 200-lb. drums to truckloads or carloads from large-capacity production facilities at our Buffalo, N. Y. plant. You can count on dependable delivery . . . plus the kind of technical service that's really helpful in putting this interesting chemical to work.

For further information, or samples, just write us a note on your letterhead.

PHYSICAL AND CHEMICAL PROPERTIES:

Appearance	white to cream-colored deliquescent small crystals
Molecular Weight	85.11
Melting Point	297° C.

Decomposition starts slightly above the melting point.
Solubility: Very soluble in water and ammonium hydroxide; slightly soluble in alcohol.

TYPICAL ANALYSIS:

Assay (KNO_2)	97.0%
Potassium Carbonate (K_2CO_3)	0.02%
Potassium Chloride (KCl)	0.002%
Potassium Hydroxide (KOH)	0.02%
Potassium Sulfate (K_2SO_4)	0.01%
Iron (Fe)	0.003%

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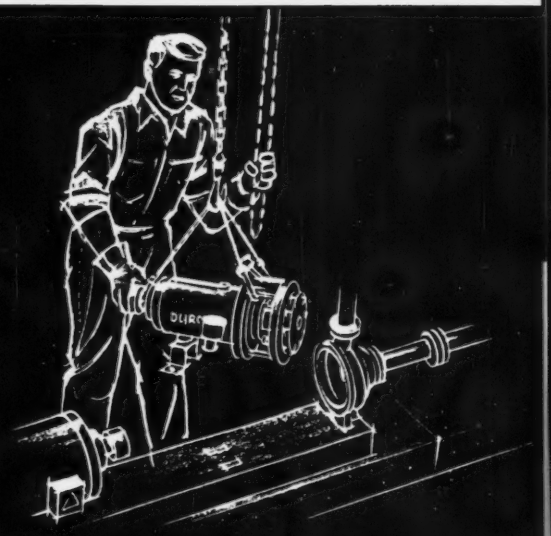
Fourteen alloys for any corrosive service

Interchangeable parts: 1 bearing housing + 1 shaft = 10 pumps



One man—one craft to remove all rotating parts

Is pump "down-time" increasing your operating expense?

Why disconnect motors and process piping when making pump repairs? The Durco Series "H" pump is designed for complete servicing by one craft to speed maintenance and cut costs.

Why inventory a multitude of bearing, housing, shaft and seal sizes? One set of these is interchangeable on Durco "H" pumps with capacities from 10 to 750 GPM and TDH from 10 to 350 ft.

Why be "short changed" on corrosion resistance? Durco leads in the development and manufacture of corrosion resistant alloys. Castings are designed for optimum corrosion resistance and hydraulic efficiency and are produced in our own foundry to assure complete quality control from raw material to finished pump.

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